Summer Assignment: Pre-Calculus

Pre Calculus has 90 Questions in 2 parts. Part A has 60 Questions; Part B has 30 Questions.

OFHS Mission Statement: Our mission is to assist students reach their full potential as proficient and organized mathematicians. We intend to do this by emphasizing the importance of perseverance, commitment, and hard work in realizing worthwhile pre-determined goals. We will emphasize our school's commitment to the Sunshine State Standards. A central focus of our teaching will be to encourage students to take responsibility for their own learning, to assist them to problem-solve, and to help them present logical, calculated and innovative solutions to challenging problems.

Things to think of before entering into Pre-Calculus:

- Students must be able to simplify expressions and solve equations algebraically.
- Students will be required to call upon knowledge that they have used in all past math classes
- Pre-Calculus students intend to pursue AP Calculus next year at OFHS. Trig and A.G. students will either terminate their studies in math or continue their studies in less rigorous courses such as College Algebra. If you intend to study higher level math you should do PRE-CALCULUS. Pre-Calculus is a much more rigorous course than Trig./ A.G. at OFHS.
- Students helping other students will be encouraged, but any final work must be that of the individual student. Grades will be determined using the following ratios: Tests 85%, Homework 10%, Class-work 5%. Obviously, the latter affect the former.
- Students will be required to continue developing their critical thinking and problem-solving skills. They should make at least a good attempt at solving tough problems and not leave them blank.
- Tests will be the main grade in the course. Students need to study for tests!
- Tests are cumulative and could have any problems that have been previously covered in the course. REVIEW! REVIEW! REVIEW!
- Word problems are an essential part of all of these courses.
- Students will be required to take detailed notes, produce summaries of these notes and do presentations at various times in the course. Participation is essential for learning.
- Students must have, and be able to use, a graphing calculator. Recommendation is a TI 84 Plus.

Summer Assignment

- This assignment will be due the first Friday of school when we return in August.
- All problems must be worked out step by step and an explanation must be given for each. This work must be attached to the back of the assignment and be well set out in numerical order.
- Answers are provided so you can check them.
    - Self Grade the assignment:
        - The numbers in the circles, next to each question, give you the value of the question. The assignment is out of: Part A 246 Part B 255 Total 501. Add both scores together. Change the score to a % and clearly write the result on the front.

Try to do the assignment in the following manner.

- Do Question 1: grade it (consult the answers provided).
    - If correct and you have all of the work shown, give yourself a grade out of the value of the question .
    - If you got it incorrect: study the answer and see if you can work it out. This skill will be a major help in Trig and Analytic Geometry. Write the solution out 3 times but do not change the

original grade. The assignment will be assessed on the basis of how well you followed these steps and not on the actual score that you received when you graded it. The percentage grade is valuable for the teacher.

- Your first test of the school year will include questions of the type included in the Summer Assignment. GET OFF TO A GREAT START TO THE YEAR.
- This will count as your first major homework grade. For each day it is late: a deduction will be made to the grade.
- Problems were picked to help guide you in reviewing over the summer. We will be diving right into the material when school starts so make sure you review any concepts you struggled with or have forgotten

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Part A

Summer Assignment Pre-Calc

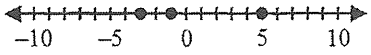
PART A (60 Questions; /246) Name:

1. For 1980 through 1990, the average salary, A, (in thousands of dollars), of assistant principals at public high schools can be modeled by $A = 2t + 25$, where $t = 0$ represents 1980. Approximate a high school assistant principal's salary in 1987.

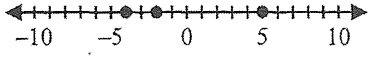
2. Evaluate $4.88 - 17.54z$ when $z = 1.44$ to two decimal places.

3. Which of the following number lines shows the graphs of 5, –1, and –4?

[A]



[B]



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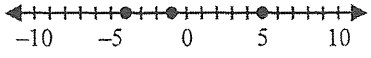
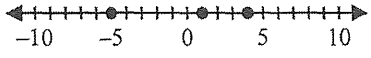


[D]



4. Is $x = -7$ a solution of the inequality $5x - 7 \le 3(x - 7)$?

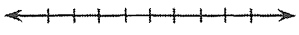
5. Solve: $4x + 3 = 39$

6. Guess and check: Which of the numbers 11, 12, or 13 is the solution of $83 = 95 - x$?

7. Solve the equation. $5(3 - 4x) = 7 - (4 - x)$

8. Solve: $|x - 4| \ge 4$

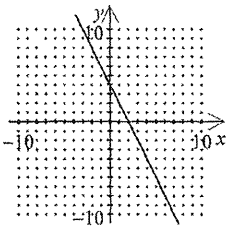
9. Graph the numbers –1.5 and –2.5 on the number line. Which is greater?



10. Evaluate $(7+5y)\div 3x$ when $x=\frac{1}{6}$ and $y=3$.

11. Graph: $2x - y = 4$

[A]



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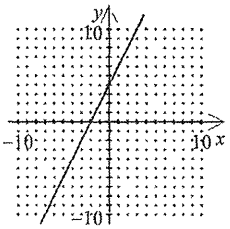

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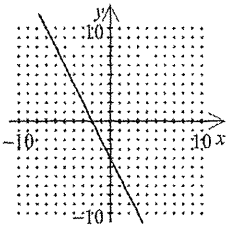

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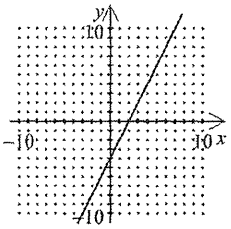
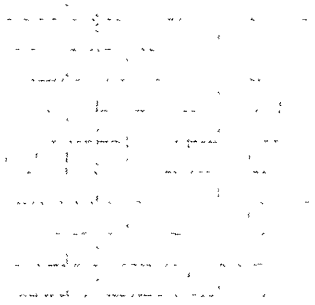


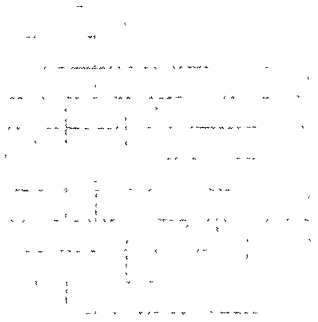
12. Graph the inequality in a coordinate plane. $3x+2y<-6$



13. Find the vertex of the graph. $y = -|x| + 4$

14. Find the slope and y-intercepts of the line. $5x - 4y = 20$

15. Graph the line. $y = -\frac{2}{3}x - 2$



16. Write an equation of a line that has slope –4 and y-intercept –9.

[A] $y = -4x + 9$ [B] $y = -4x - 9$ [C] $x = -4y + 9$ [D] $y = -\frac{1}{4}x - 9$

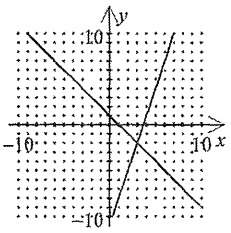
17. Find the slope of the line passing through (4, –1) and (5, –2).

18. Solve the linear system: $2x + 2y = -16$
$x - 2y = 1$

[A] no solution [B] (–5, –3) [C] $(0, -8)$ [D] (–26, –3)

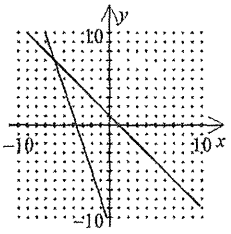
19. Solve the system by graphing: $x + y = 1$
$y = 3x - 11$

[A]



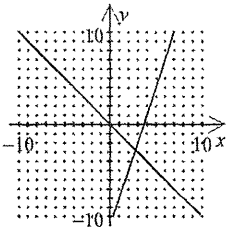
$(3, -2)$

[B]



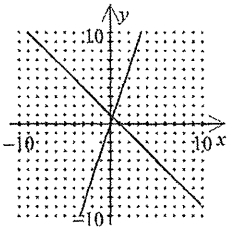
$(-6, 7)$

[C]



$\left(\frac{11}{4}, -\frac{11}{4}\right)$

[D]

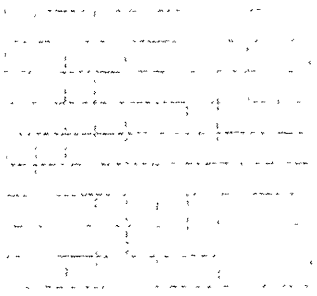


$\left(\frac{1}{4}, \frac{3}{4}\right)$

(19.)

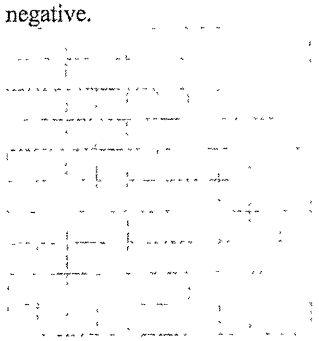
20. Solve the linear system: [A] (–6, 6) [B] (–2, 5) [C] (2, 5) [D] no solution
$5x + 5y = -2$
$y = -x$

21. Sketch the graph of the system. Estimate the solution.
$3x - 2y = -7$
$x + y = 1$



22. Is (5, –2) a solution of the system?
$2x + 6y = -2$
$2x + y = 6$

23. Write and graph a system of inequalities in which x and y are each less than 4 and not negative.



24. The drama club sold 1500 tickets for the end-of-year performance. Admission prices were $12 for adults and $6 for students. The total amount collected at the box office was $15,480. How many students attended the play?

25. Solve the system.
$3x + 4y = -3$
$2x + \ y = 8$

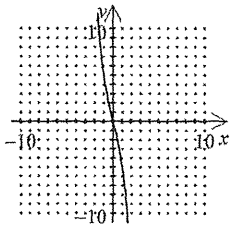
26. Graph the function. Label the vertex, axis of symmetry, and x-intercepts.
$y = 2(x+4)(x+7)$

27. Write the quadratic equation in vertex form. What is the vertex? $y = -4x^2 - 56x - 204$

28. Solve: $3x^2 - 24x = -48$

29. Graph: $f(x) = x^3 - 4x$

[A]



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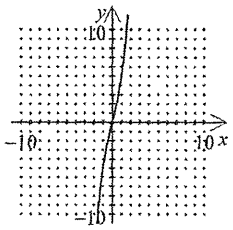

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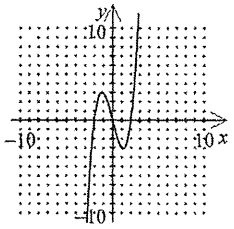
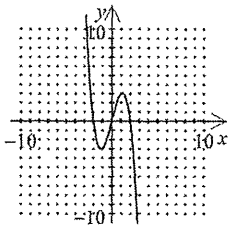
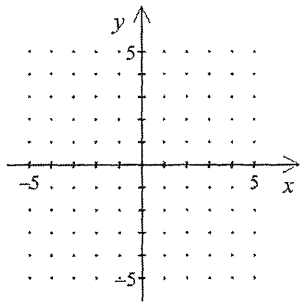


[D]



30. Sketch the graph of the function. $f(x) = x^3 + 3x^3 + 3x + 1$



31. Divide: $(-2x^3 - 3x + 2) \div (x - 1)$

[A] $-2x^2 - 5x + 5 + \frac{7}{x-1}$

[B] $-2x^2 - 5x - 3 - \frac{3}{x-1}$

[C] $-2x^2 - 2x - 1 - \frac{2}{x-1}$

[D] $-2x^2 - 2x - 5 - \frac{3}{x-1}$

32. Factor completely with respect to the integers. $5x^4 + 10x^2 - 15$

33. Decide whether the function is a polynomial function. If it is, state its degree, type, and leading coefficients.
$f(x) = 2x^3 - 2x^2 + 3.$

34. Simplify: $3x^3 \cdot 3x$

35. The volume of one of the buildings in the downtown area is 933,120 cubic meters. The building is 10 times as tall as the radio tower on top of the building. The square base has a side that is 27 times 4 meters less than the height of the radio tower. How tall is the radio tower?

[A] 6 meters [B] 20 meters [C] 16 meters [D] 8 meters

36. Multiply: $(x-5)(x^2 - x - 3)$

[A] $x^3 - 6x^2 - 8x + 15$

[B] $x^3 - 4x^2 + 2x + 15$

[C] $x^3 - x^2 + 15$

[D] $x^3 - 6x^2 + 2x + 15$

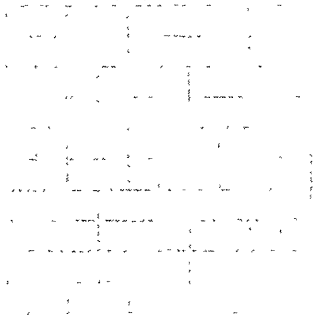
37. One of the zeros of the function $f(x) = x^4 + 2x^3 - 13x^2 - 38x - 24$ is $x = -3$, find the other zeros of the function.

38. Use a calculator to evaluate $25^{-4/3}$ to three decimal places.

39. Simplify: $\left(5^{4/5} \cdot 5^{4/5}\right)^{-10}$

40. Evaluate $\sqrt[5]{1540}$ to three decimal places using a calculator.

41. Sketch the graph of the function. Is the inverse of $f(x)$ a function? $f(x) = 2 - x^2$



42. The number of bacteria present in a culture after t minutes is given as $B = 100e^{kt}$. If there are 5287 bacteria present after 13 minutes, find k.

[A] 0.293 [B] 0.305 [C] 51.582 [D] 3.968

43. Write an equation for the inverse of the relation. $y = 18x - 7$

44. Sara bought 4 fish. Every month the number of fish she has doubles. After m months she will have F fish, where $F = 4 \cdot 2^m$. How many fish will Sara have after 2 months if she keeps all of them and the fish stay healthy?

[A] 16 [B] 64 [C] 20 [D] 8

45. Graph: $f(x) = \sqrt[3]{x-3} - 1$

46. Let $f(x) = 9 - x^2$ and $g(x) = 3 - x$. Find $(f - g)(x)$.

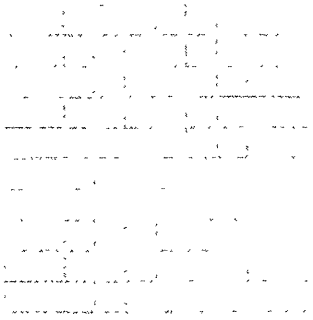
47. Expand the expression. $\log_4 3x^{-1}y^3$

48. Is $f(x) = 10.2e^{0.04t}$ an example of exponential growth or decay?

49. Use the formula $A = Pe^{rt}$. If \$1400 is deposited in an account at the bank and earns 7% annual interest, compounded continuously, what is the amount in the account, rounded to the nearest dollar, after 11 years?

50. Identify all horizontal and vertical asymptotes of the graph of the function. $f(x) = \dfrac{5x}{x^2 - 1}$

51. Sketch the graph of $x^2 + y^2 = 15$.



52. Find the points of intersection, if any, of the graphs in the system.
$y^2 + 4x = 0$
$x + y = 1$

53. Solve the equation by completing the square. $x^2 + 2x - 35 = 0$

54. Solve by completing the square: $9x = 5x^2 - 1$

[A] $\frac{-9+\sqrt{101}}{10}$ and $\frac{-9-\sqrt{101}}{10}$

[B] $\frac{-9+\sqrt{61}}{10}$ and $\frac{-9-\sqrt{61}}{10}$

[C] $\frac{9+\sqrt{61}}{10}$ and $\frac{9-\sqrt{61}}{10}$

[D] $\frac{9+\sqrt{101}}{10}$ and $\frac{9-\sqrt{101}}{10}$

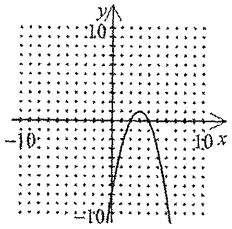
55. Solve by completing the square: $-8x = 4x^2 - 1$

56. Write the quadratic equation in vertex form: $y = \frac{5}{7}x^2 + 30x + 318$

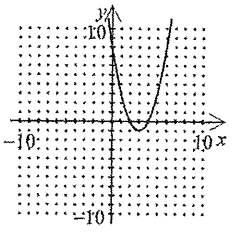
57. Graph the function. Label the vertex, axis of symmetry, and x-intercepts.
$y = x^2 + 3x + 4$

58. Write in standard form and graph: $y = (x+3)^2 - 1$

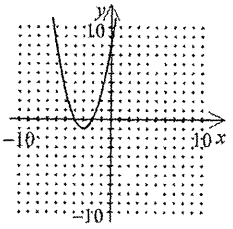
[A] $y = -x^2 + 6x - 10$



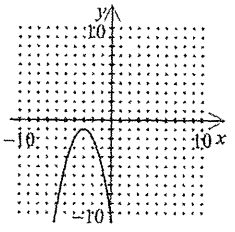
[B] $y = x^2 - 6x + 8$



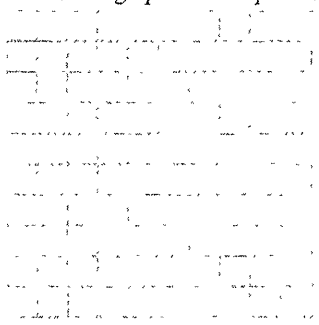
[C] $y = x^2 + 6x + 8$



[D] $y = -x^2 - 6x - 10$



59. Sketch the graph of the equation. $y = -x^2 - 4x - 1$



60. Find the *vertex* of the parabola and determine if it opens *up* or *down*. $y = 7 - 8x - 2x^2$

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Part B

PRE-CALCULUS SUMMER ASSIGN

PART B (30 QUESTIONS) NAME

1. In a financial deal, you are promised $700 the first day and each day after that you will receive 75% of the previous day's amount. When one day's amount drops below $1, you stop getting paid from that day on. What day is the first day you would receive no payment and what is your total income?

   [A] 24th day; $2795.32 total income
   [B] 29th day; $2796.25 total income
   [C] 24th day; $2796.25 total income
   [D] 20th day; $2798.13 total income

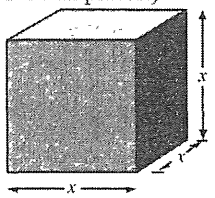
2. Solve the system by substitution: $x+4y=-7$
   $y=2x-4$

3. Find the absolute value of the complex number. $-5i$

4. Find the points of intersection, if any, of the graphs in the system.
   $x^2+y^2=20$
   $x-2y=0$

5. Identify the sequence as arithmetic, geometric, or neither.
   1, 1, 2, 3, 5, 8, 13, . . .

6. The surface area of a cube is 380 square inches. How long is each edge? (Round to two decimal places.)



7. Write the expression as a complex number in standard form. $\dfrac{4+3i}{7+i}$

   [A] $\dfrac{31}{50}+\dfrac{17}{50}i$ [B] $\dfrac{1}{2}+\dfrac{1}{2}i$ [C] $\dfrac{4}{7}+3i$ [D] $\dfrac{31}{48}+\dfrac{17}{48}i$

8. Graph the function $y=x^3-2x^2-x+2$.

9. The volume of one of the buildings in the downtown area is 933,120 cubic meters. The building is 10 times as tall as the radio tower on top of the building. The square base has a side that is 27 times 4 meters less than the height of the radio tower. How tall is the radio tower?

   [A] 6 meters [B] 20 meters [C] 16 meters [D] 8 meters

10. Solve: $x^2 - x = 0$ [A] 0, –1 [B] 1, –2 [C] 0, 1 [D] 1, –1

11. Solve the equation. Check for extraneous solutions. $\sqrt{x + 42} = x$

    [A] 7 [B] no solution [C] 7, –6 [D] –6

12. Divide: $\frac{2k^4}{4z^4} \div \frac{k^7}{z^7}$

13. Write an equation for the inverse of the relation. $y = 18x - 7$

14. Find the common ratio of the geometric sequence.

    $-\frac{1}{3}$, 1, –3, 9, . . .

15. Let $f(x) = 4x$. Find f^{-1}.

16. Factor completely with respect to the integers. $4x^3 - 8x^2 + 3x - 6$

17. Evaluate without using a calculator. $\log_2 16$

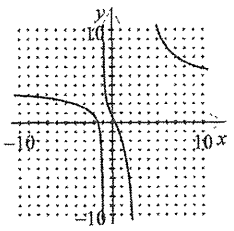
18. Rewrite $11^{1/4}$ using radical notation.

19. One of the zeros of the function $f(x) = x^3 + 5x^2 - 9x - 45$ is $x = -5$. find the other zeros of the function.

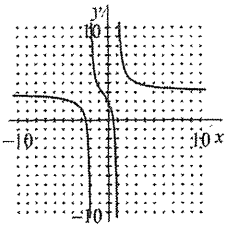
20. Evaluate $e^{2.53}$ to three decimal places.

21. Graph the rational function $f(x) = \dfrac{3x^2 - 2x - 1}{x^2 - x - 6}$.

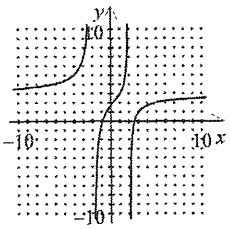
[A]



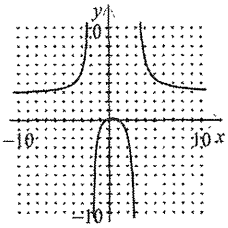
[B]



[C]



[D]



22. If \$100 is invested at 6% compounded monthly for 8 years the compounded amount is given by $A = 100(1.005)^{96}$. Given that log 1.005 = 0.00217, find log A. (Note that $100 = 10^2$.)

23. Find the points of intersection, if any, of the graphs in the system.
$y^2 + 4x = 0$
$x + y = 1$

24. Find all the zeros of the function: $f(x) = 15x^4 - 19x^3 - 9x^2 + 19x - 6$

25. Multiply: $\dfrac{9y^2}{4} \cdot \dfrac{16x}{12y}$

26. Identify the focus and directrix of the parabola given by $x^2 = 12y$.

27. Simplify: $\left(\dfrac{b^{25}}{c^{20}}\right)^{4/5}$

28. Solve: $x^2+4x+13 = 0$

[A] $2 + 3i$, $2 - 3i$ [B] $-2 + 6i$, $-2 - 6i$

[C] $2 + 6i$, $2 - 6i$ [D] $-2 + 3i$, $-2 - 3i$

29. Sketch the graph of the equation $y = 7x^2$.

30. The amount of money, A, accrued at the end of n years when a certain amount, P, is invested at a compound annual rate, r, is given by $A = P(1+r)^n$. If a person invests \$190 in an account that pays 5% interest compounded annually, find the balance after 10 years.

[A] \$10,956 [B] \$309 [C] \$1140 [D] \$11,400

Keep scrolling for solutions

PRE-CALC — SUMMER ASSIGN (PART A) 60 QUESTIONS

1. $A = 2t + 25$

Years	1980	'81	...	89	90
t =	0	1		9	10

1987; $t = 7$ $A = 2(7) + 25$

$= 39$

Assist. Principals Salary = \$39,000 in 1987 (3)

PART A 246

2. $4.88 - 17.54z$

$= 4.88 - 17.54(1.44)$

$= 4.88 - 25.2576$

$= -20.3776$

$= -20.38$ (2D.P.) (3)

3. [C] (3)

4. $5x - 7 \leq 3(x-7)$

$x = -7$ Test: $5(-7) - 7 = -35 - 7 = -42$ | $3(-14) = -42$

$-42 = -42$ True / Yes in Soln. (3)

5. $4x + 3 = 39$

$-3 \quad -3$

$\frac{4x}{4} = \frac{36}{4}$

$x = 9$ (3)

6. $83 = 95 - (12)$ (3)

7. $5(3 - 4x) = 7(4 - x)$

$15 - 20x = 7 - 4 + x$

$15 - 20x = 3 + x$

$-15 \quad -x \quad -15 \quad -x$

$\frac{-21x}{-21} = \frac{-12}{-21}$

$x = \frac{4}{7}$ (3)

8. $|x - 4| \geq 4$

Let $|x - 4| = 4$

Either $x - 4 = 4$ or $-(x-4) = 4$

$x = 8$ $\quad x - 4 = -4$

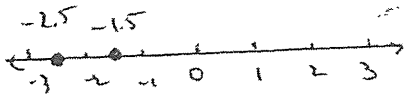
$x = 0$

Test $x = 2$ False $\therefore \{x :$

$x = -1$ True

$x = 9$ True. $x \leq 0 \cup x \geq 8\}$ (3)

/24

9. 

-1.5 is greater. (3)

10. $\frac{7+5y}{3x}$

$x = \frac{1}{6}$, $y = 3$

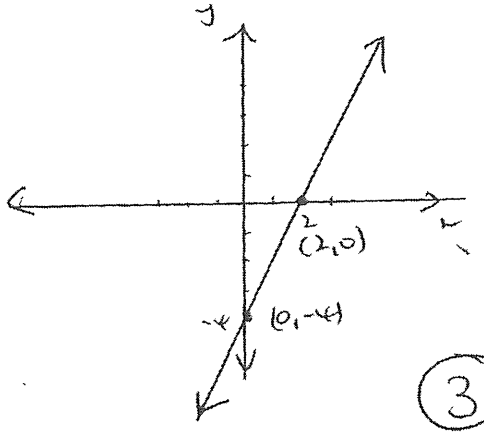
$\frac{7+5(3)}{\frac{3}{1}\cdot\frac{1}{6}}$

$= \frac{22}{\frac{1}{2}}$

$= 44$ (3)

11. $2x - y = 4$

x	y
2	0
0	-4



[D] (3)

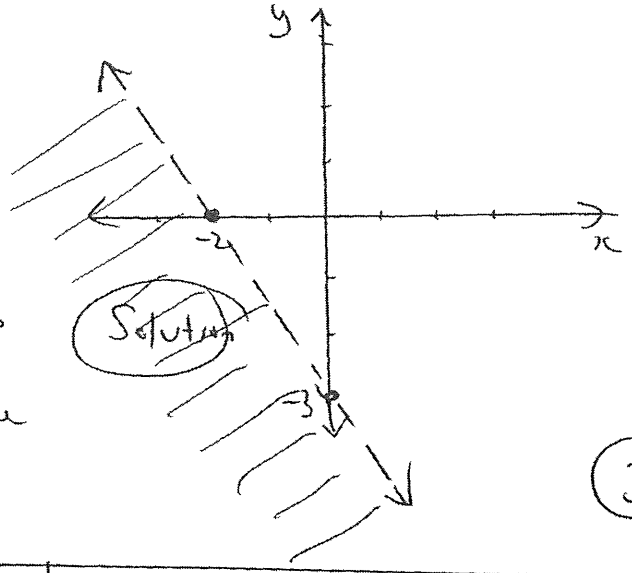
12. $3x + 2y < -6$

Let $3x + 2y = -6$

x	y
-2	0
0	-3

Test (0,0) $0 < -6$ False

Shade other side



(3)

13. $y = -|x| + 4$

$\rightarrow x = 0$, $y = 4$

Vertex is $(0, 4)$ (3)

14. $5x - 4y = 20$

$-5x \qquad -5x$

$\frac{-4y}{-4} = \frac{-5x}{-4} + \frac{20}{-4}$

$y = \frac{5}{4}x - 5$

Slope is $\frac{5}{4}$

y-int is $(0, -5)$ (3)

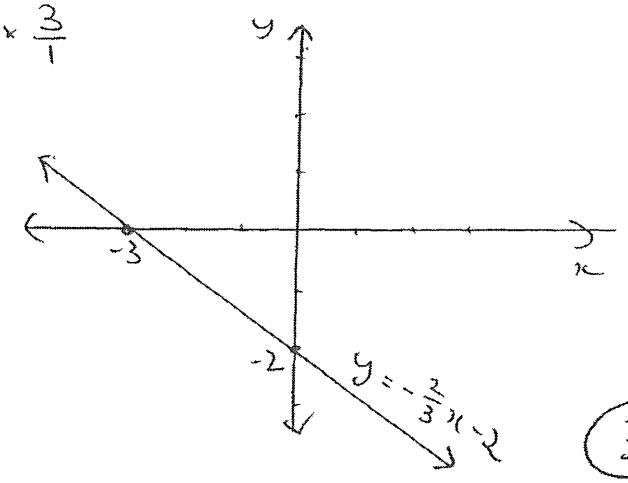
/18

15. $\left[y = -\frac{2}{3}x - 2\right] \times \frac{3}{1}$

$\times 3$ $\quad 3y = -2x - 6$

$2x + 3y = -6$

x	y
-3	0
0	-2



3

16. $y = mx + b$

$y = -4x - 9$

[B]

3

17. $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad (4, -1)$ $(5, -2)$ $\quad x_1\ y_1$ $\quad x_2\ y_2$

$= \frac{(-2) - (-1)}{(5) - (4)}$

$= \frac{-1}{1} = -1$

Slope $= -1$

3

18. $2x + 2y = -16$ ①

$x - 2y = 1$ ②

① ÷ 2 $\quad x + y = -8$ ③

② × −1 $\quad -x + 2y = -1$ ④

③ + ④ $\quad 3y = -9$

$y = -3$

Sub ② $\quad x - 2(-3) = 1$

$x + 6 = 1$

$-6 \quad -6$

$x = -5$

$(-5, -3)$ [B]

3

19. $x + y = 1$ ①

$y = 3x - 11$ ②

CHECK

Sub ② into ①

$x + 3x - 11 = 1$

$4x - 11 = 1$

$+11 \quad +11$

$\frac{4x}{4} = \frac{12}{4}$

$x = 3$

$y = -2$

$(3, -2)$

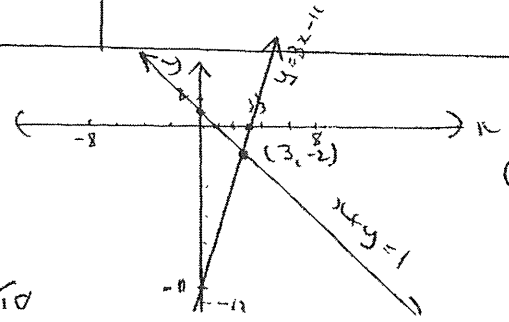
3

19: GRAPHING:

$x + y = 1$ $\quad 3x - y = 11$

x	y
1	0
0	1

x	y
$\frac{11}{3}$	0
0	-11



Graphically $(3, -2)$

3

/10

20. $5x+5y=-2$ -①

$y=-x$ -②

Sub ② → ① $5x+5(-x)=-2$

$0 \neq -2$

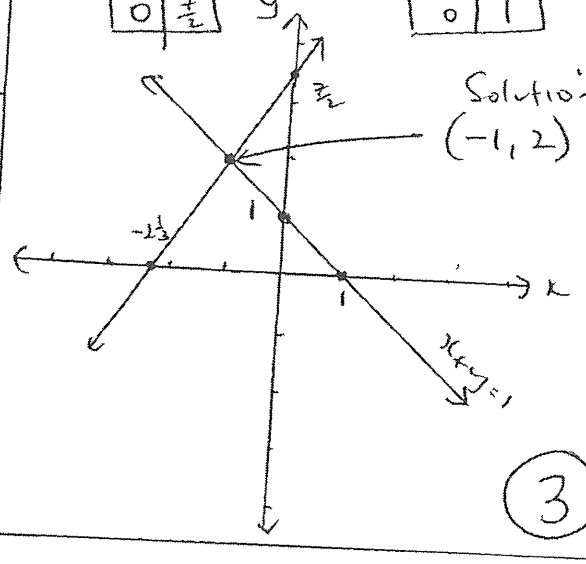
No Solution [D] (3)

21.

$3x-2y=-7$ $x+y=1$

x	y
$-\frac{7}{3}$	0
0	$\frac{7}{2}$

x	y
1	0
0	1



Solution. $(-1, 2)$

(3)

22.

$2x+6y$ | $2x+y$

$=2(5)+6(-2)$ | $=2(5)+(-2)$

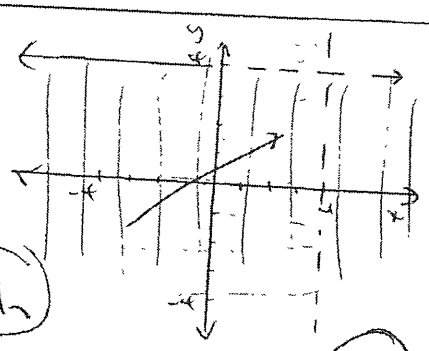
$=10-12$ | $=10-2$

$=-2$ | $=8$

$-2 \neq 8$

Not a Soln. (3)

23.



Soln

(3)

24. Let # adult tkts be A

" " student " " S

$A+S=1500$ -①

$12A+6S=15480$ -②

② × -12 $-12A-12S=-18000$ -③

② + ③ $-6S=-2520$

$S=420$

$\therefore A=1080$ (3)

420 students attended.

25. $3x+4y=-3$ -①

$2x+y=8$ -②

② × -4 $-8x-4y=-32$ -③ (3)

① + ③ $-5x=-35$

$x=7$ (7, -6)

Sub ② $14+y=8$

$y=-6$

18

26. $y = 2(x+4)(x+7)$

Intercepts $y = 0$ (x-intercepts)

$2(x+4)(x+7) = 0$

$\therefore x = -4, -7$

x-int $(-4, 0), (-7, 0)$ (3)

$y = 2(x^2 + 7x + 4x + 28)$

$= 2(x^2 + 11x + 28)$

$= 2x^2 + 22x + 56$

$a \quad b \quad c$

Axis of Sym

$x = \frac{-b}{2a} = -\frac{22}{4} = -\frac{11}{2}$ (3)

$x = -\frac{11}{2}$

Vertex Sub $x = -\frac{11}{2}$

$y = 2\left(-\frac{11}{2}\right)^2 + 22\left(-\frac{11}{2}\right) + 56$

$= \frac{2^1}{1} \times \frac{121}{4_2} - \frac{22}{1} \cdot \frac{11}{2_1} + 56$

$= \frac{121}{2} - \frac{65}{1}$

$= \frac{121 - 130}{2} = -\frac{9}{2}$

$\therefore$ Vertex $\left(-\frac{11}{2}, -\frac{9}{2}\right)$ (3)

27. $y = -4x^2 - 56x - 204$

$= -4(x^2 + 14x + 51)$

$= -4[(x+7)^2 - 49 + 51]$

$= -4[(x+7)^2 + 2]$

$= -4(x+7)^2 - 8$

Vertex $= (-7, -8)$ (6)

28. $3x^2 - 24x + 48 = 0$

$\div 3$ $x^2 - 8x + 16 = 0$

$(x-4)^2 = 0$

$x = 4.$ (3)

$1 \times \cancel{16} -4$

$1 \times \cancel{x} -4$

29. G.C. OK

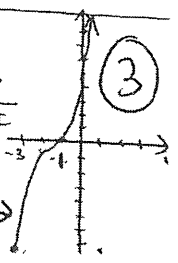
[C] (3)

30. Table of Values (Sketch)

x	-3	-2	-1	0	1	2	3
y	-8	-1	0	1	8	27	64

$f(x) = x^3 + 3x^2 + 3x + 1$

(3)



24

31. $\dfrac{-2x^3-3x+2}{x-1}$

Syn. Div.

	x^3	x^2	x	x^0
1	-2	0	-3	$+2$
		-2	-2	-5
	-2	-2	-5	-3
	x^2	x	x^0	R

$\dfrac{-2x^3-3x+2}{x-1} = -2x^2-2x-5-\dfrac{3}{x-1}$ 4

Long Div.

$$x-1 \;\overline{)\; -2x^3+0x^2-3x+2}$$

$$-2x^2-2x-5-\frac{3}{x-1}$$ 4

$-2x^3+2x^2$

$-2x^2-3x$

$-2x^2+2x$

$-5x+2$

$-5x+5$

-3

6

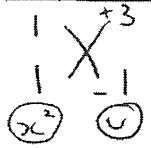
---

32. $5x^4+10x^2-15$

$= 5(x^4+2x^2-3)$

$= 5(x^2+3)(x^2-1)$

$= 5(x^2+3)(x-1)(x+1)$ 6



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33. Cubic Polynomial
Degree 3
Lead Co-eff. 2 (3)

34. $3x^3 \cdot 3x = 9x^4$ (3)

---

35. Let "R" be the height of Tower

$V = 10R \cdot 27(R-4) \cdot 27(R-4)$

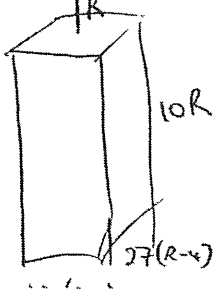
$933120 = 7290R(R-4)(R-4)$

$R^3-8R^2+16R-128 = 0$

↳ R.C. $R=8$ ⌈D⌉ /17

$(R^2-4R)(R-4)$

R^3-8R^2+16R (9)



36. $(x-5)(x^2-x-3)$

$= x(x^2-x-3) - 5(x^2-x-3)$

$= x^3 - x^2 - 3x - 5x^2 + 5x + 15$

$= x^3 - 6x^2 + 2x + 15$ [D] (3)

---

37. $x = -3$ is a zero $\therefore (x+3)$ is a factor by factor theorem

Syn. Div.

-3	1	2	-13	-38	-24
		-3	3	$+30$	$+24$
	1	-1	-10	-8	0

$\therefore x^4 + 2x^3 - 13x^2 - 38x - 24 = (x+3)(x^3 - x^2 - 10x - 8)$

(Guess another zero) $x = -1$ $\therefore (-1)^3 - (-1)^2 - 10(-1) - 8$ $\therefore (x+1)$ is a factor.

$= -1 - 1 + 10 - 8 = 0$

-1	1	-1	-10	-8
		-1	2	$+8$
	1	-2	-8	0

$= (x+3)(x+1)(x^2 - 2x - 8)$

$= (x-3)(x+1)(x-4)(x+2)$

Other zeros are $x = 4, -1, -2$. (9)

---

38. $25^{-\frac{4}{3}} = 0.014$ (3)

---

39. $\left(5^{\frac{4}{5}} \cdot 5^{\frac{4}{5}}\right)^{-10}$

$= \left(5^{\frac{8}{5}}\right)^{\frac{-10}{1}}$

$= 5^{-16}$

$= \frac{1}{5^{16}}$ (3)

40. $\sqrt[5]{1540}$

G.C. $1540 \wedge (1/5)$

$= 4.340.$ (3)

21

41. $f(x) = 2 - x^2$

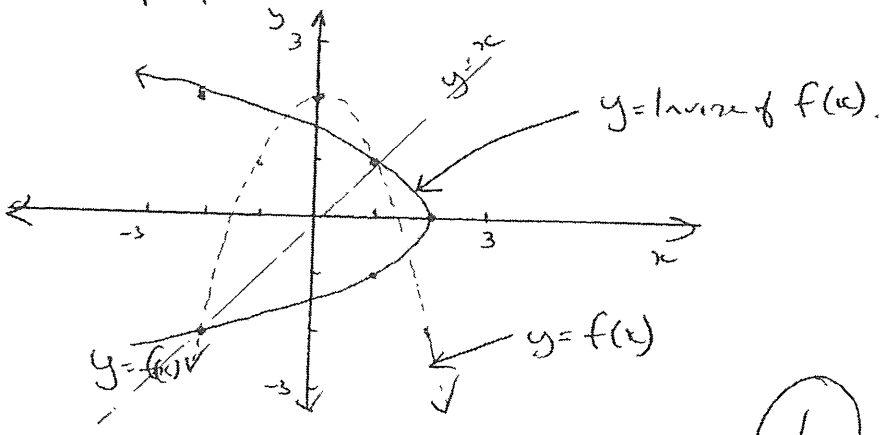
f(x)

x	-2	-1	0	1	2
y	-2	1	2	1	-2

f'(x)

x	-2	1	2	1	-2
y	-2	-1	0	1	2

(swap x & y)



Inverse is not a function fails V.L.T. (6)

OR.

Function fails the horizontal L.T.

---

42. $B = 100e^{kt}$ $t = 13$, $B = 5287$

$5287 = 100e^{13k}$

$e^{13k} = 52.87$

$\ln[e^{13k}] = \ln 52.87$

$\frac{13k}{13} = \frac{\ln 52.87}{13}$

(6)

$\therefore k = .305$ [B]

---

43. $y = 18x - 7$ (3)

inv $x \to y$ $x = 18y - 7$

$\therefore 18y = x + 7$

$\therefore y = \frac{x+7}{18}$

44. $F = 4 \cdot 2^m$

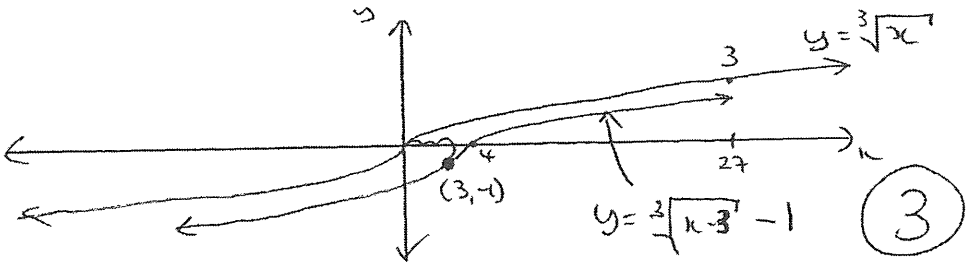
$m = 2$ $= 4 \cdot 2^2$

$= 16$

[A] (3)

18

45.



3

46. $f(x) = 9-x^2 \quad g(x) = 3-x$

$(f-g)(x) = (9-x^2)-(3-x)$

$= 6 - x^2 + x$

3

47. $\log_4 3x^{-1}y^3 = \log_4\left[\frac{3y^3}{x}\right]$

$= \log_4 3 + 3\log_4 y - \log_4 x$

3

48. Exponential growth $\therefore$ 0.04 is positive 3

49. $A = Pe^{rt} \quad P = 1400$

$= 1400e^{(.07.11)} \quad r = .07$

$= 3024$ (round to whole) $\quad t = 11$

Amount \$3024.

3

50. $f(x) = \frac{5x}{x^2-1}$

V.A. (Denom. = zero)

$x = \pm 1$

HA. $\lim x \to \infty, f(x) \to 0$

Vertical Asy $x = +1, x = -1$

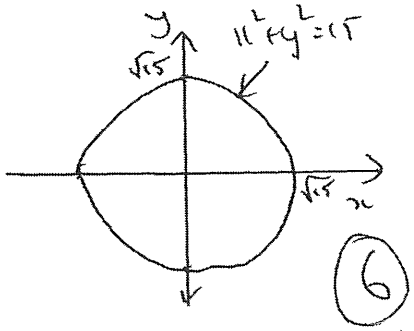
Horizontal Asy $y = 0$

6

51. $x^2+y^2 = 15$

Circle, center (0,0)

radius $\sqrt{15}$



6

52. $y^2+4x = 0 \quad -①$

$x+y = 1 \quad -②$

$x = 1-y$

②

Sub ① $y^2+4(1-y) = 0$

$y^2-4y+4 = 0$ $\quad 1 \times -2$, 1×-2

$(y-2)^2 = 0$

$\therefore y = 2$

$x = -1$

3

$\cap = (-1,2)$

/30

53. $x^2+2x-35=0$

$(x+1)^2-1-36=0$

$(x+1)^2=36$

$x+1=\pm 6$

$\therefore x=5, x=-7$

(3)

54.

$5x^2-9x-1=0$

$\frac{5}{5}\left(x^2-\frac{9}{5}x-\frac{1}{5}\right)=\frac{0}{5}$

$\left(x-\frac{9}{10}\right)^2-\frac{81}{100}-\frac{20}{100}=0$

$\left(x-\frac{9}{10}\right)^2=\frac{101}{100}$

Ext) $x-\frac{9}{10}=\frac{\sqrt{101}}{10}$ or $x-\frac{9}{10}=-\frac{\sqrt{101}}{10}$

$x=\frac{9+\sqrt{101}}{10}$ or $x=\frac{9-\sqrt{101}}{10}$

[D]

(6)

55. $-8x=4x^2-1$

$4x^2+8x-1=0$

$\frac{4}{4}\left(x^2+2x-\frac{1}{4}\right)=\frac{0}{4}$

$(x+1)^2-1-\frac{1}{4}=0$

$(x+1)^2-\frac{5}{4}=0$

$(x+1)^2=\frac{5}{4}$

Ext) $x+1=\sqrt{\frac{5}{4}}$ or $x+1=-\sqrt{\frac{5}{4}}$

$x=-1\pm\frac{\sqrt{5}}{2}$

$=\frac{-2+\sqrt{5}}{2}$, $\frac{-2-\sqrt{5}}{2}$

(9)

56. $y=\frac{5}{7}x^2+30+318$

$=\frac{5}{7}\left(x^2+42+\frac{318}{1}\cdot\frac{7}{5}\right)$

$=\frac{5}{7}\left[(x+21)^2-\frac{441}{1}+\frac{318}{1}\cdot\frac{7}{5}\right]$

$=\frac{5}{7}(x+21)^2-315+318$

$y=\frac{5}{7}(x+21)^2+3$

Vertex] $(-21,3)$

(9)

57. $y=x^2+3x+4$

$=\left(x+\frac{3}{2}\right)^2-\frac{9}{4}+\frac{16}{4}$

$=\left(x+\frac{3}{2}\right)^2+\frac{7}{4}$

Vertex] $\left(-\frac{3}{2},\frac{7}{4}\right)$

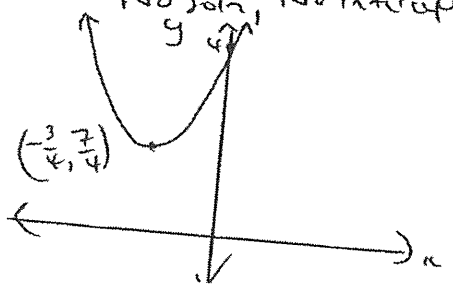
Axis of Sym] $x=-\frac{3}{2}$

(6)

x int, $y=0$] $\left(x+\frac{3}{2}\right)^2+\frac{7}{4}=0$

$\left(x+\frac{3}{2}\right)^2=-\frac{7}{4}$

No Soln, No Intercept



/72

58. $y = (x+3)^2 - 1$

$= x^2 + 6x + 9 - 1$

$y = x^2 + 6x + 8$

Vertex $(-3, -1)$

Opens up.

[C]

(3)

59. $y = -x^2 - 4x - 1$

$= -(x^2 + 4x + 1)$

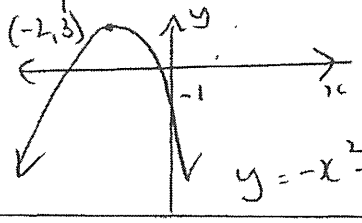
$= -[(x+2)^2 - 4 + 1]$

$= -[(x+2)^2 - 3]$

$= -(x+2)^2 + 3$

Vertex $(-2, 3)$

Opens Down



$y = -x^2 - 4x - 1$.

(6)

60. $y = -2x^2 - 8x + 7$

$= -2\left(x^2 + 4x - \frac{7}{2}\right)$

$= -2\left[(x+2)^2 - 4 - \frac{7}{2}\right]$

$= -2\left[(x+2)^2 - \frac{15}{2}\right]$

$= -2(x+2)^2 + 15$

(6)

Vertex $(-2, 15)$

Opens Downwards.

15

Keep scrolling for solutions part B

PRE-CALCULUS SUMMER ASSIGNMENT

PART B
255

PART B (30 QUESTIONS)

1. $700, 75\%\times 700, (75\%)^2 700, (75\%)^3 700, \ldots, (75\%)^{n-1} 700$

n^{th} term $= (75\%)^{n-1} \times 700$ $\quad n = \#$ of days.

$\therefore (0.75)^{n-1} \times 700 < 1$

$(0.75)^{n-1} < \frac{1}{700}$

Take logs] $\log(0.75)^{(n-1)} < \log\left(\frac{1}{700}\right)$

$(n-1)\log(0.75) < \log\left(\frac{1}{700}\right) \rightarrow$ Careful: $\log(0.75)$ = negative (SWAP Sign)

$n-1 > \frac{\log\left(\frac{1}{700}\right)}{\log(0.75)}$

$n > 1 + \frac{\log\left(\frac{1}{700}\right)}{\log(0.75)}$ (15)

$n > 23.77 \quad \therefore n = 24$

$\therefore$ Sum of 23 terms] (No pay on 24th day)

$S_n = \frac{a_1(1-r^n)}{1-r}$ (Sum of a Geometric Sequence)

$S_{23} = \frac{700(1-(0.75)^{23})}{(1-0.75)}$

$= 2796.25$ Answer [C] (10)

---

2. $x + 4y = -7$ ①

$y = 2x - 4$ ②

Sub ② → ① $x + 4(2x-4) = -7$

$x + 8x - 16 = -7$

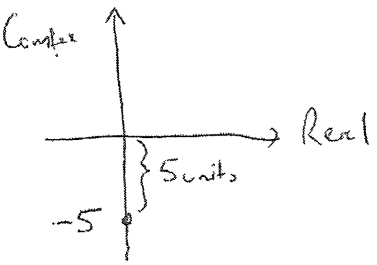
$9x = 9$

$x = 1$

$y = -2$

$(1, -2)$ (5)

/30

3. 

Absolute value = 5.

(5)

4. $x^2+y^2=20$ -①

$x+2y=0$ -②

② $x=-2y$

Sub into ①

$(-2y)^2+y^2=20$

$4y^2+y^2=20$

$5y^2=20$

$y^2=4$

$y=\pm 2$ (10)

Sub into ② $y=2, x=-4$

$y=-2, x=4$

Intersection $(-4,2)$; $(4,-2)$

5. 1, 1, 2, 3, 5, 8, 13

(1, 1, 2)

Arithmetic: difference changes ✗

Geometric $\frac{1}{1}=\frac{2}{1}$? ratio different ✗

Neither (5)

6. $SA = 6 \times x^2$

$\therefore 6x^2 = 380$

$x^2 = \frac{380}{6}$

$x = +\sqrt{\frac{380}{6}} = 7.96$

Edge = 7.96 inches. (10)

7. $\frac{(4+3i)}{(7+i)} \times \frac{(7-i)}{(7-i)}$

$= \frac{28-4i+21i-3i^2}{49-i^2}$

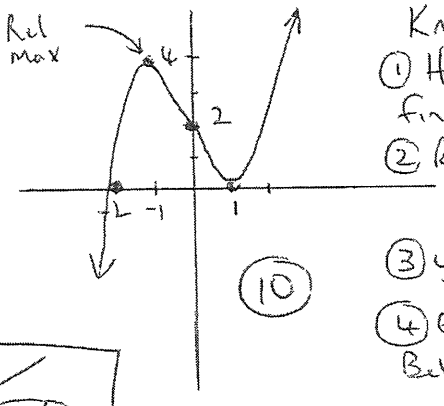
$= \frac{28+17i+3}{49+1}$

$= \frac{31}{50} + \frac{17i}{50}$ (10)

[A]

8. $y = x^3 - 2x^2 - x + 2$

(Label clearly from a G.C.)



(10)

Know:

① How to find zeros

② Relative Max/Min.

③ y-intercept

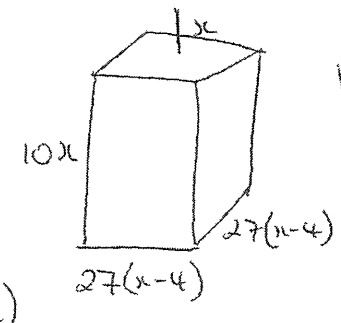
④ End Behavior

50

9. $V = 10x(27(x-4))^2$

$= 10x(729(x^2-8x+16))$

$= 7290(x^3-8x^2+16x)$



$V = l \times w \times h$

So $933120 = 7290(x^3-8x^2+16x)$

$x^3-8x^2+16x-128=0 \longrightarrow$ G.C $y = x^3-8x^2+16x-128$

↳ Find zero $x=8$

[D] (15)

10. $x^2-x=0$

$x(x-1)=0$

$x=0, 1$ [C]

(5)

11. $\sqrt{x+42} = x$

Sq] $x+42 = x^2$

$x^2 - x - 42 = 0$

$(x+6)(x-7)=0$

$x=-6, 7$

Extraneous Soln] Sub

$x=-6$ $\sqrt{36} = -6$ False.

$x=7$ $\sqrt{49} = 7$ True.

1 +6

1 −7

[A] (10)

12. $\frac{2k^4}{4^4} \div \frac{k^7}{z^7}$

$= \frac{2k^4}{4^4} \times \frac{z^7}{k^7}$

$= \frac{z^3}{2k^3}$ (5)

13. $y = 18x-7$

Inverse

Swap $x \to y$] $x = 18y-7$

$18y = x+7$

$y = \frac{x+7}{18}$

↳ Inverse (5)

14 ↖

$-\frac{1}{3}, 1, -3, 9$ (5)

Geom. Ratio $= \frac{-3}{1} = -3$

15. $f(x) = 4x$

Let $y = 4x$

Swap $x \to y$ (5)

$x = 4y$

$y = \frac{x}{4}$

$\therefore f^{-1}(x) = \frac{x}{4}$

/50

16 $4x^3-8x^2+3x-6$

$\frac{p}{q} = \frac{\pm 6, \pm 3, \pm 2, \pm 1}{\pm 4, \pm 2, \pm 1}$

Guess $x=1$ ✗

$x=-1$ $-4-8-3-6$ ✗

$x=2$ $32-32+6-6$

$\therefore (x-2)$ is a factor

Syn. Division

$$\begin{array}{c|cccc} 2 & 4x^3 & -8 & 3 & -6 \\ & & 8 & 0 & 6 \\ \hline & 4x^2 & 0x & 3 \text{ is} & 0 \end{array}$$

$\therefore 4x^3-8x^2+3x-6$

$= (x-2)(4x^2+3)$ → Cannot be factored.

(15)

17. $\log_2 16 = x$

$2^x = 16$ (exp form)

$x = 4$ (5)

18 $11^{\frac{1}{4}}$

$= \sqrt[4]{11}$ (5)

19 $x^3+5x^2-9x-45$

If $x=-5$ is a zero $(x+5)$ is a factor

$$\begin{array}{c|cccc} -5 & 1x^3 & 5 & -9 & -45 \\ & & -5 & 0 & +45 \\ \hline & 1x^2 & 0 & -9 \text{ is} & 0 \end{array}$$

$(x+5)(x^2-9)$

$= (x+5)(x-3)(x+3)$

Zeros when $(x+5)(x-3)(x+3) = 0$ (10)

$\therefore$ Other zeros $x = \pm 3$.

20. $e^{2.53} = 12.554$ (5)

21 $f(x) = \frac{3x^2-2x-1}{x^2-x-6}$ [D]

$= \frac{3x^2-2x-1}{(x-3)(x+2)}$ (10)

$1X^{-3}_{+2}$

Vert. Asym $x = -2, 3$

Vert Asym $y = \frac{3}{1} = 3$ (Infinity Tail)

22 $A = 100(1.005)^{96}$

$\log A = \log[100(1.005)^{96}]$

$\log A = \log[10^2] + \log(1.005)^{96}$

$= 2 + 96(\log 1.005)$

$= 2 + 96(.00217)$ (10)

$= 2.20832$

60

23. $y^2 + 4x = 0$ — ①

$x + y = 1$ — ②

$x = 1 - y$

Sub ① $y^2 + 4(1-y) = 0$

$y^2 + 4 - 4y = 0$

$y^2 - 4y + 4 = 0$

$(y-2)^2 = 0$ (10)

$\therefore y = 2, x = -1 \quad (-1, 2)$

25. $\frac{9^3 y x}{4_1} \cdot \frac{4^1}{16 x} = 3xy$ (5)

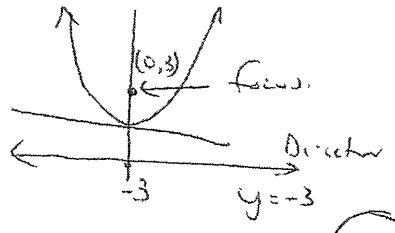
26. $x^2 = 4py$ (std form of $y = ax^2$)

$x^2 = 12y$

$4p = 12$

$p = 3$ (focal length)

Sketch:



(10)

Focus $(0, 3)$

Director $y = -3$.

24 $f(x) = 15x^4 - 19x^3 - 9x^2 + 19x - 6$

$\frac{p}{q} = \frac{\pm 6, \pm 3, \pm 2, \pm 1}{\pm 15, \pm 5, \pm 3, \pm 1}$

Test $x = 1$: $15 - 19 - 9 + 19 - 6 = 0$

$\therefore x = 1$ is a zero, $(x-1)$ is a factor

1	$15x^4$	-19	-9	19	-6
		15	-4	-13	6
	15	-4	-13	6	0 ✓

$f(x) = (x-1)(15x^3 - 4x^2 - 13x + 6)$

Test $x = -1$: $15(-1) - 4(-1)^2 - 13(-1) + 6$

$-15 - 4 + 13 + 6 = 0$

$\therefore (x+1)$ is a zero $(x+1)$ is a factor

-1	$15x^3$	-4	-13	6
		-15	$+19$	-6
	15	-19	6	0

$f(x) = (x-1)(x+1)(15x^2 - 19x + 6)$

$15 \cdot 6 = 90$, $3 \cdot 5 = 15$, $-3 \cdot -2 = 6$

$f(x) = (x-1)(x+1)(5x-3)(3x-2)$

Zeros $x = -1, 1, \frac{3}{5}, \frac{2}{3}$

$5x - 3 = 0 \qquad 3x - 2 = 0$

$x = \frac{3}{5} \qquad x = \frac{2}{3}$ (15)

40

27. $\left(\frac{b^{25}}{c^{20}}\right)^{\frac{4}{5}} = \frac{b^{\frac{25}{1}\cdot\frac{4}{5}}}{c^{\frac{20}{1}\cdot\frac{4}{5}}} = \frac{b^{20}}{c^{16}}$ (5)

28 $x^2+4x+13=0$ $\quad a=1, b=4, c=13$

$x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$= \frac{-(4)\pm\sqrt{(4)^2-4(1)(13)}}{2(1)}$

$= \frac{-4\pm\sqrt{16-52}}{2}$

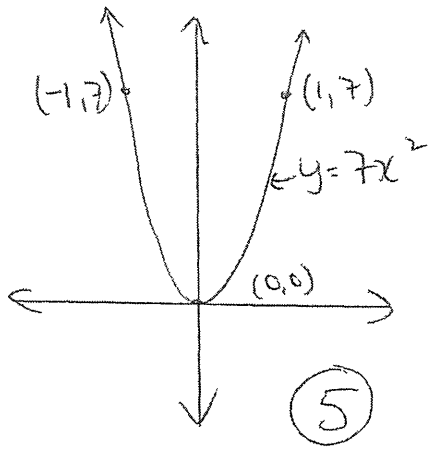
$= \frac{-4\pm\sqrt{-36}}{2}$

$= \frac{-4\pm 6i}{2}$

$= -2\pm 3i$

[D] (10)

29. $y = 7x^2$



(5)

30 $A = P(1+r)^n$ $\quad P=190$

$= 190(1+.05)^{10}$ $\quad r=.05$

$= 190(1.05)^{10}$ $\quad n=10$

≈ 309.490

[B] (5)

25