Mr. Lorenzo's AP Calculus AB-Summer Assignment

AP Calculus Summer Assignment: Prerequisites for Calculus

Name:_____ **Due Date: August 10,2017**

For each equation, find the slope and the *y*-intercept.

1. $y = 3x - 1$ _____ **2.** $y = \frac{1}{2}x + 2$ _____ **3.** $y = -x + \frac{1}{2}$ _____

Write an equation in slope-intercept form for each line.

4. with a slope of 2 and a *y*-intercept of -1 _____

5. containing $(0, -3)$ and with a slope of $\frac{1}{3}$ _____

Write an equation in slope-intercept form for the line that contains each pair of points.

6. (1, 1) and (3, 5) _____ **7.** (2, −4) and (−1, 5) _____

8. (2, 4) and (−4, 1) _____ **9.** (1, 0) and (3, 2) _____

Write an equation for each line in point-slope form.

1. containing $(4, -1)$ and with a slope of $\frac{1}{2}$ _____

2. crossing the *x*-axis at $x = -3$ and the *y*-axis at $y = 6$ _____

3. containing the points $(-6, -1)$ and $(3, 2)$ _____

Rewrite each equation in slope-intercept form.

4. the line from Exercise **1.** _____

5. the line from Exercise **2.** _____

6. the line from Exercise **3.** _____

7. In what situations would you find it easier to use point-slope form, and in what situations would you find it easier to use slope-intercept form? _____

Factor each trinomial. If the trinomial cannot be factored, write *prime*.

1. $x^2 - x - 2$

_____

2. $x^2 + 3x - 4$

_____

3. $x^2 + 4x + 3$

_____

4. $x^2 - 4x + 3$

_____

5. $x^2 + 2x - 8$

_____

6. $x^2 + x - 20$

_____

7. $x^2 + 2x - 15$

_____

8. $x^2 - 3x + 10$

_____

9. $x^2 - x - 12$

_____

10. $x^2 + 6x + 8$

_____

11. $x^2 - 20x + 36$

_____

12. $x^2 + 2x - 24$

_____!

Solve by factoring.

1. $x^2 - 4x - 12 = 0$

2. $x^2 - 6x + 9 = 0$

3. $x^2 - 9x + 14 = 0$

4. $x^2 + 6x + 5 = 0$

5. $x^2 - 7x + 10 = 0$

6. $x^2 - 36 = 0$

7. $x^2 + 8x + 16 = 0$

8. $x^2 - x - 12 = 0$

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

10. $4x^2 + 4x + 1 = 0$

Use the quadratic formula to solve each equation.

1. $x^2 - 5x + 4 = 0$

2. $x^2 - 2x - 24 = 0$

3. $x^2 + 6x + 9 = 0$

4. $x^2 + 3x - 10 = 0$

5. $2x^2 - x - 6 = 0$

6. $2x^2 + x - 4 = 0$

Use the quadratic formula to find the zeros of each function.

1. $y = x^2 + 2x - 8$ **2.** $y = 2x^2 - x - 15$ **3.** $y = 4x^2 - 8x + 3$

Give the value of each discriminant. What does the discrimant tell you about the function?

1. $y = 4x^2 + 4x + 1$ **2.** $y = x^2 + 5x + 4$ **3.** $y = x^2 + 5x + 8$

Let $f(x) = 5 - \frac{2x}{3}$ and $g(x) = \frac{1}{2}x^2 + 3x$. Evaluate each function.

1. $f(6)$ **2.** $f(0)$

3. $f\left(\frac{1}{2}\right)$ **4.** $g(1)$

5. $g(-2)$ **6.** $g\left(\frac{1}{2}\right)$

7. $f(1) + g(0)$ **8.** $g(4) - f(5)$

9. $f(0) \cdot g(0)$ **10.** $g(-6) \cdot f(-6)$

Let $f(x) = 3x^2 + 2$, $g(x) = 2x - 1$, and $h(x) = x^2 + 5x$. Find each new function, and state any domain restrictions.

1. $(f + g)(x)$ **2.** $(f - h)(x)$

3. $(h - g)(x)$ **4.** $(gh)(x)$

5. $(hg)(x)$ **6.** $(f + h)(x)$

7. $\left(\frac{f}{g}\right)(x)$ **8.** $\left(\frac{h}{g}\right)(x)$

!

Let $f(x) = x^2 - 1$, $g(x) = 3x$, and $h(x) = 5 - x$. Find each composite function.

1. $(f \circ g)(x)$ _____

2. $(g \circ f)(x)$ _____

3. $(h \circ f)(x)$ _____

4. $(h \circ g)(x)$ _____

5. $(g \circ g)(x)$ _____

6. $(h \circ h)(x)$ _____

7. $(g \circ h)(4)$ _____

8. $(f \circ f)(-3)$ _____

9. $(f \circ (g \circ h))(1)$ _____

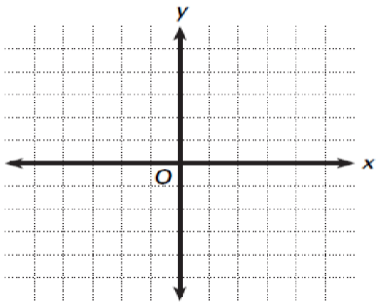
10. $(g \circ (g \circ g))(5)$ _____

Evaluate.

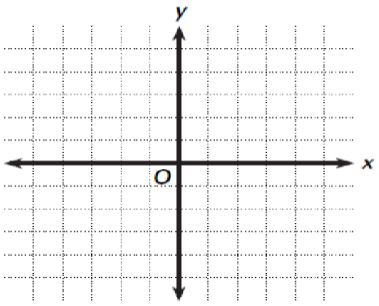
1. $|4.2|$ _____
2. $[4.2]$ _____
3. $\lceil 4.2 \rceil$ _____
4. $|-1.8|$ _____
5. $[-1.8]$ _____
6. $\lceil -1.8 \rceil$ _____
7. $|2| + |-7|$ _____
8. $|2| - |-7|$ _____
9. $[-2.3] + [-1.8]$ _____
10. $\lceil 2.7 \rceil - \lceil -3.4 \rceil$ _____
11. $\lceil -3 \rceil - [-3]$ _____
12. $|-8.5| + [3.7]$ _____

Graph each function.

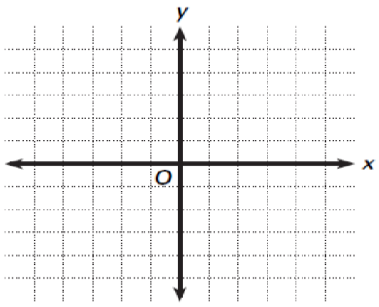
15. $f(x) = \begin{cases} x + 3, \text{ if } x < 0 \\ -2x + 5 \text{ if } x \geq 0 \end{cases}$



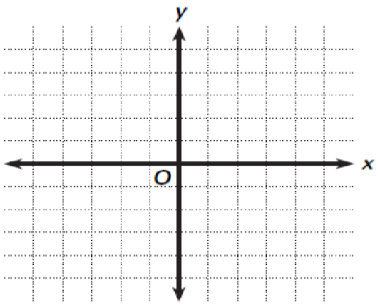
16. $f(x) = \begin{cases} \frac{1}{2}x \text{ if } -4 \leq x \leq 2 \\ 2x - 3 \text{ if } x > 2 \end{cases}$



17. $f(x) = \begin{cases} |x| \text{ if } x \leq 1 \\ 2 - |x - 2| \text{ if } x > 1 \end{cases}$



18. $f(x) = \begin{cases} [x] \text{ if } -2 \leq x \leq 1 \\ \lceil x \rceil \text{ if } 1 < x \leq 4 \end{cases}$



Solve each equation. Round your answers to the nearest hundredth.

1. $7^x = 80$

2. $5^x = 10$

3. $6^x = 1296$

4. $4^{x+1} = 100$

5. $2^{x-3} = 25$

6. $3^{x+4} = 27$

7. $6^{2x-7} = 216$

8. $5^{3x-1} = 49$

9. $10^{x+5} = 125$

Evaluate each logarithmic expression to the nearest hundredth.

1. $\log_6 18$

2. $\log_5 100$

3. $\log_2 400$

4. $\log_8 512$

5. $\log_{10} 215$

6. $\log_{\frac{1}{2}} 24$

7. $\log_{13} 110$

8. $\log_{2.5} 76$

9. $\log_{\frac{1}{16}} 329$

Simplify each expression.

1. $e^{\ln 4}$ _____

2. $e^{\ln 15}$ _____

3. $e^{2 \ln 3}$ _____

4. $\ln e^{9}$ _____

5. $\ln e^{5}$ _____

6. $5 \ln e^{3}$ _____

Solve each equation for x by using the natural logarithmic function.

7. $e^{x} = 34$ _____

8. $3e^{x} = 120$ _____

9. $e^{x} - 8 = 51$ _____

10. $\ln x = 2.5$ _____

11. $\ln(3x - 2) = 2.8$ _____

12. $\ln e^{x} = 5$ _____

Identify the parent function for each of the following:

1. $y = -2|x + 1| - 4$ _____

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

3. $y = 3 \cdot 2^{-x} + 1$ _____

4. $y = -3(x + 2) - 4$ _____

5. $y = \frac{3}{x} + 2$ _____

6. $y = \frac{3}{x + 2}$ _____

7. $y = 3x^2 - 4$ _____

8. $y = -2(x - 1)^2$ _____

Describe the transformations of the parent functions included in each equation.

1. $y = -3|x + 2| - 3$ _____

_____

_____

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

_____

_____

3. $y = 4|x - 1| + 2$ _____

_____

_____

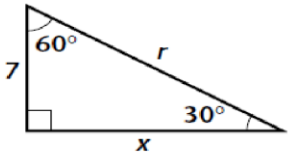
4. $y = 4 \cdot 2^x - 2$ _____

_____

_____

Find the missing side lengths in each right triangle.

1.



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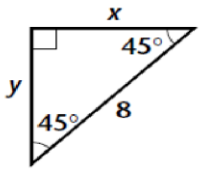

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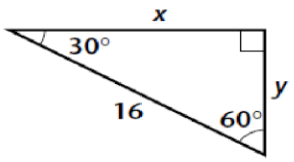


_____

Find each trigonometric value. Give exact answers.

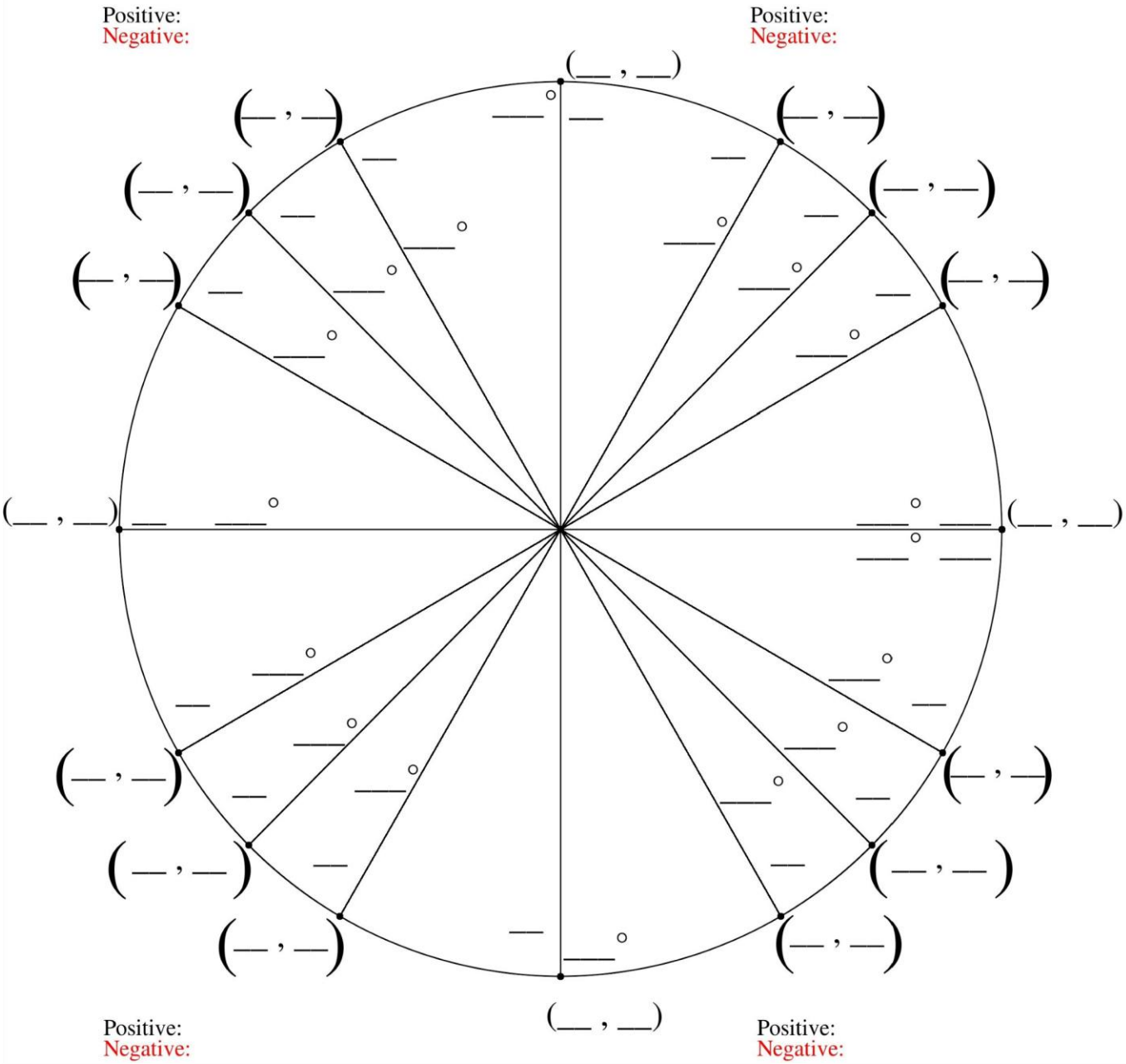
1. sin 120° _____ **2.** cos 330° _____ **3.** tan 225° _____ **4.** cos 150° _____

5. sin 240° _____ **6.** sin 150° _____ **7.** tan 315° _____ **8.** cos 225° _____

Point *P* is located at the intersection of a circle centered at the origin with a radius of *r* and the terminal side of angle θ in standard position. Find the exact coordinates of point *P*.

12. $\theta = 135°, r = 6$ _____ **13.** $\theta = 30°, r = 10$ _____ **14.** $\theta = 300°, r = 12$ _____

Fill in The Unit Circle



Evaluate each expression. Give exact answers.

1. $\sin\frac{3\pi}{4}$ _____ **2.** $\cos\frac{2\pi}{3}$ _____ **3.** $\tan\frac{5\pi}{6}$ _____

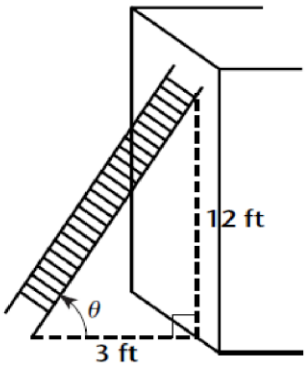
4. $\cos\left(-\frac{7\pi}{6}\right)$ _____ **5.** $\tan\left(-\frac{\pi}{4}\right)$ _____ **6.** $\sin\pi$ _____

Find the measure of each angle to the nearest whole degree.

1. Find the measure of the smallest angle in a right triangle with sides of 3, 4, and 5 centimeters. _____

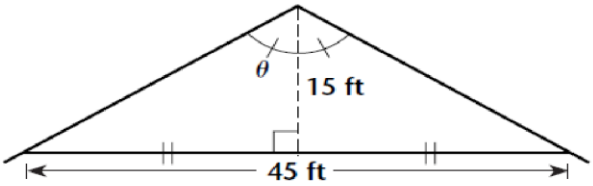
2. What is the angle between the bottom of the ladder and the ground as shown at right?

_____



3. Find the angle at the peak of the roof as shown at right.

_____



4. The hypotenuse of a right triangle is 3 times as long as the shorter leg. Find the measure of the angle between the shorter leg and the hypotenuse. _____

Convert the following degree measures to radian measures. Give exact answers.

1. 270° _____ **2.** 45° _____ **3.** 225° _____

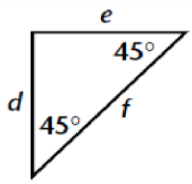
4. 210° _____ **5.** −90° _____ **6.** −300° _____

Convert each of the following radian measures to degree measures.

7. $\frac{\pi}{4}$ _____ **8.** $\frac{3\pi}{2}$ _____ **9.** $\frac{5\pi}{6}$ _____

10. $\frac{5\pi}{3}$ _____ **11.** -3π _____ **12.** $-\frac{11\pi}{6}$ _____

The length of one side of a 45-45-90 triangle is given. Find the lengths of the other two sides in simplest radical form.

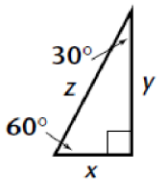


1. $d = 13, e =$ _____ **2.** $d = 4, e =$ _____

$f =$ _____ $f =$ _____

3. $e = 4.5, f =$ _____ **4.** $f = 9\sqrt{2}, d =$ _____

$d =$ _____ $e =$ _____



The length of one side of a 30-60-90 triangle is given. Find the lengths of the other two sides in simplest radical form.

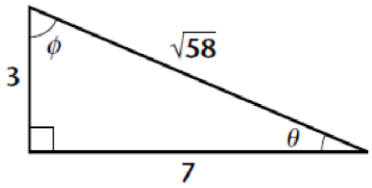
5. $x = 4, y =$ _____ **6.** $x = 3\sqrt{3}, z =$ _____

$z =$ _____ $y =$ _____

7. $y = 7\sqrt{3}, x =$ _____ **8.** $y = 18, z =$ _____

$z =$ _____ $x =$ _____

Refer to the triangle at right to find each value. Give exact answers.



1. $\sin\theta$ _____ **2.** $\cos\theta$ _____

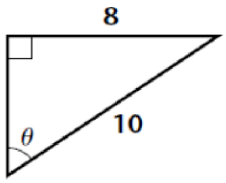
3. $\tan\theta$ _____ **4.** $\csc\theta$ _____

5. $\sec\theta$ _____ **6.** $\cot\theta$ _____ **7.** $\sin\phi$ _____

8. $\cos\phi$ _____ **9.** $\tan\phi$ _____ **10.** $\csc\phi$ _____

Find θ to the nearest degree in each triangle.

1.



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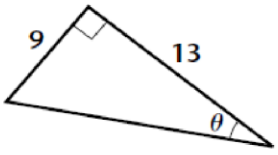
2.



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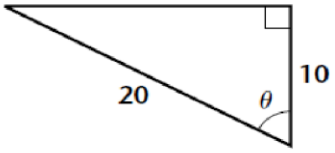
3.



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Find each value. Give answers in degrees and in radians. (It may be helpful to review what you learned about 30°-, 45°-, and 60°-angles.)

1. $\text{Sin}^{-1}\left(\frac{1}{2}\right)$ _____ **2.** $\text{Cos}^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ _____ **3.** $\text{Tan}^{-1}(\sqrt{3})$ _____

4. $\text{Sin}^{-1}(-1)$ _____ **5.** $\text{Cos}^{-1}\left(\frac{\sqrt{3}}{2}\right)$ _____ **6.** $\text{Tan}^{-1}(-1)$ _____

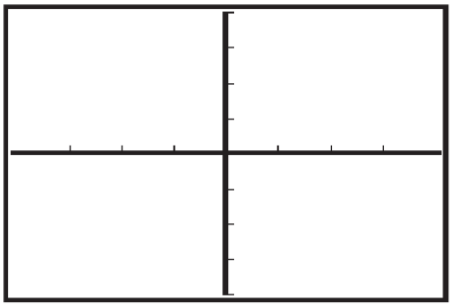
Evaluate each composite trigonometric expression.

7. $\tan\left(\text{Cos}^{-1}\left(\frac{\sqrt{3}}{2}\right)\right)$ _____ **8.** $\cos\left(\text{Sin}^{-1}\left(\frac{1}{\sqrt{2}}\right)\right)$ _____ **9.** $\sin\left(\text{Tan}^{-1}\left(-\frac{1}{\sqrt{3}}\right)\right)$ _____

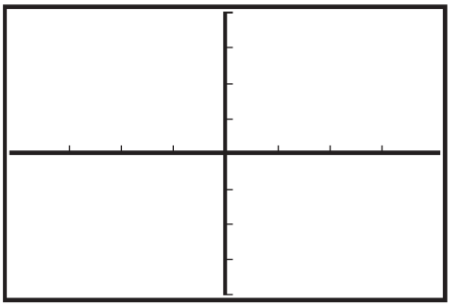
10. $\text{Sin}^{-1}(\cos 0°)$ _____ **11.** $\text{Tan}^{-1}(\sin 0°)$ _____ **12.** $\text{Sin}^{-1}(\sin 90°)$ _____

Verify each identity by graphing each side separately. Sketch the common graph.

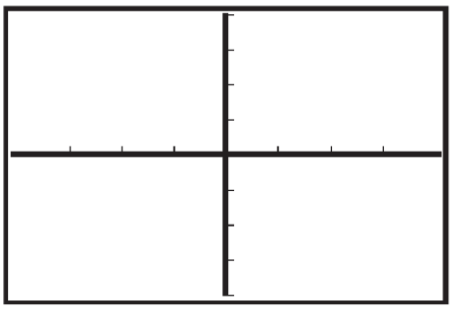
1. $\tan \theta = \frac{\sin \theta}{\cos \theta}$



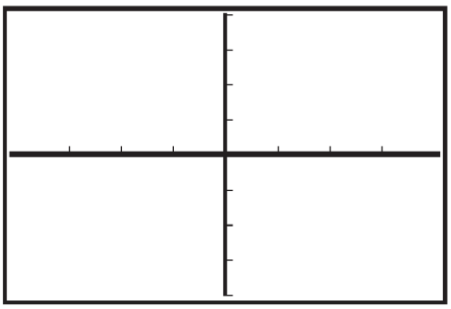
2. $\sin^2 \theta + \cos^2 \theta = 1$



3. $\tan^2 \theta + 1 = \sec^2 \theta$



4. $1 + \cot^2 \theta = \csc^2 \theta$



For exercises 5–10, show on your own paper how the first expression simplifies to the second expression.

1. $\sin x \cot x$ to $\cos x$

2. $\sin x \sec x \cot x$ to 1

3. $\cos^2 x - \sin^2 x$ to $1 - 2 \sin^2 x$

4. $(1 + \sin x)(1 - \sin x)$ to $\cos^2 x$

9. $\tan x + \cot x$ to $\sec x \csc x$

6. $(\cos x - \sin x)^2$ to $1 - 2 \cos x \sin x$