

## Calculus I Prerequisite Worksheet

1. For each of the following, find the equation of the line satisfying the given information. Write your answers in point-slope form.

- Line through the point (2,3) with slope  $m = 1/3$ .
- Line through the points (2,3) and (-3,2).
- The vertical line through the point (-3,2).
- The horizontal line through the point (-3,2).
- The line through the point (2,3) that is parallel to the line  $2x - 5y = 4$ .
- The line through the point (2,3) that is perpendicular to the line  $2x - 5y = 4$ .

2. Rationalize the numerator:  $\frac{\sqrt{x+4} - 2}{x}$

3. Simply the difference quotient  $\frac{f(x+h) - f(x)}{h}$  for each of the following functions:

a.  $f(x) = -2x^2 + 3x - 1$

b.  $f(x) = \frac{1}{x+2}$

c.  $f(x) = \sqrt{x+2}$

4. Solve the following quadratic equations. Give exact answers.

a.  $x^2 + 3x = 2$

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

c.  $3x^2 = 5x - 6$

5. Use the given triangle to find:

a.  $\sin x$

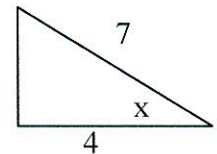
b.  $\cos x$

c.  $\tan x$

d.  $\sec x$

e.  $\csc x$

f.  $\cot x$



6. Evaluate the following **without the use of a calculator**:

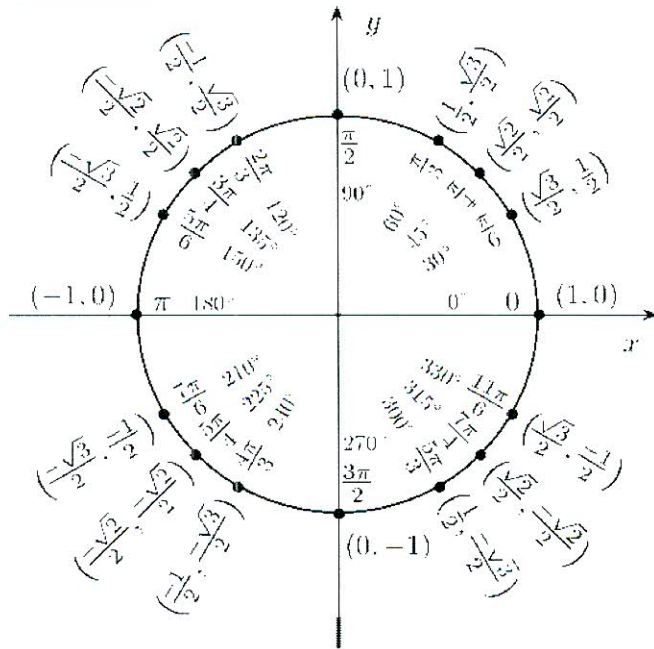
$$\sin 0 = \underline{\quad} \quad \cos \frac{\pi}{4} = \underline{\quad} \quad \sin \frac{3\pi}{4} = \underline{\quad} \quad \cos(-\pi) = \underline{\quad} \quad \sin \frac{7\pi}{6} = \underline{\quad} \quad \tan \frac{2\pi}{3} = \underline{\quad}$$

7. Evaluate the following **without the use of a calculator**:

$$\arcsin \frac{1}{2} = \underline{\quad} \quad \cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) = \underline{\quad} \quad \arctan(-\sqrt{3}) = \underline{\quad}$$

## Stuff you need to know from Precalculus

### Unit Circle



### Trig Identities

$$\sec x = \frac{1}{\cos x} \quad \csc x = \frac{1}{\sin x} \quad \cot x = \frac{1}{\tan x}$$

$$\tan x = \frac{\sin x}{\cos x} \quad \cot x = \frac{\cos x}{\sin x}$$

$$\cos^2 x + \sin^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

$$\sin(2x) = 2 \sin x \cos x$$

$$\cos(2x) = \cos^2 x - \sin^2 x$$

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

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

### Equations of lines

Slope-Intercept form  $y = mx + b$

Point-Slope form  $y - y_1 = m(x - x_1)$

Normal line is perpendicular to tangent line

### Radicals

If  $x^2 = a$ , then  $x = \pm\sqrt{a}$

### Even and Odd Functions

If  $f(-x) = f(x)$ , then  $f$  is an even function

If  $f(-x) = -f(x)$ , then  $f$  is an odd functions

### Exponents

$$a^0 = 1, a \neq 0$$

$$a^1 = a$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^{-m} = \frac{1}{a^m}, a \neq 0$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

### Logarithms

$$\ln 1 = 0$$

$$\ln e = 1$$

$$\ln mn = \ln m + \ln n$$

$$\ln \frac{m}{n} = \ln m - \ln n$$

$$\ln m^n = n \ln m$$

$$e^{\ln x} = x = \ln e^x$$

$$\log_b x = \frac{\ln x}{\ln a}$$

### Conversion formula:

$$\log_b x = y$$

$$\Leftrightarrow$$

$$b^y = x$$

### Geometric Formulas

Triangle  $A = \frac{1}{2}bh$

Equilateral Triangle  $A = \frac{\sqrt{3}}{4}s^2$

Circle  $A = \pi r^2, C = 2\pi r$

Sphere  $V = \frac{4}{3}\pi r^3, SA = 4\pi r^2$

Cylinder  $V = \pi r^2 h$

Cone  $V = \frac{\pi}{3}r^2 h$

## AP Calculus Precalculus Review #1

Name: \_\_\_\_\_

Welcome back! I hope you had a great summer! Answer the following questions without using a calculator. You can use your parent graph sheet to help when sketching graphs. You can use a QR code reader on your mobile device to scan the code to the right of the question if you need help, or click on the code if viewing digitally. Complete all graphs on the provided graph paper. Each graph should have actual plotted points that are labeled.

Write an equation of the line with the given characteristics.

1. A line that goes through the point  $(1, -6)$  and has a slope of 3.
2. A vertical line through the point  $(0, -3)$ .
3. A line that goes through the point  $(3, 1)$  and is parallel to the line represented by  $2x - y = -2$ .
4. A line that goes through the point  $(3, 1)$  and is perpendicular to the line represented by  $2x - y = -2$ .
5. A line with an x-intercept at  $(3, 0)$  and a y-intercept at  $(0, -5)$



For each of the following equations, find the a) domain, b) range, and c) graph the function.

6.  $y = -2 + \sqrt{1-x}$



7.  $y = 2e^{-x} - 3$

8.  $y = \ln(x-3) + 1$

9.  $y = -|2x-2| + 1$

10. 
$$f(x) = \begin{cases} -x-2, & -2 \leq x \leq -1 \\ x, & -1 < x \leq 1 \\ -x+2, & 1 < x \leq 2 \end{cases}$$



Find  $f(g(x))$  and  $g(f(x))$ .

11.  $f(x) = 2 - x^2, g(x) = \sqrt{x+2}$



Find  $f^{-1}$

12.  $f(x) = \frac{2x+1}{x+3}$



Find the six trigonometric values. Give exact answers.

13.  $\theta = \cos^{-1}\left(\frac{3}{7}\right)$



Solve the equation over the interval  $0 \leq x < 2\pi$ .

14.  $3 \sin(x) - 4 = -2.5$



Find all of the asymptotes and holes for the function

15.  $y = \frac{2x^2 - 6x - 8}{x^2 + 7x + 6}$



Simplify the expression.

16.  $\frac{\frac{2}{x} + \frac{3}{y}}{\frac{-5}{x} + \frac{7}{y}}$



Solve each equation. Leave your answer in log form.

17.  $4 - 3^x = 0$



18.  $5\log_4 x - \log_4 3 = 2$

19. Prove the identity:

$$\sin\theta(\cot\theta + \tan\theta) = \sec\theta$$



20. Solve the following equations:

a)  $x^2 - 2x - 35 = 0$



b)  $6x^2 - 11x - 7 = 3$

