

**Precalc C Summer Review Packet**

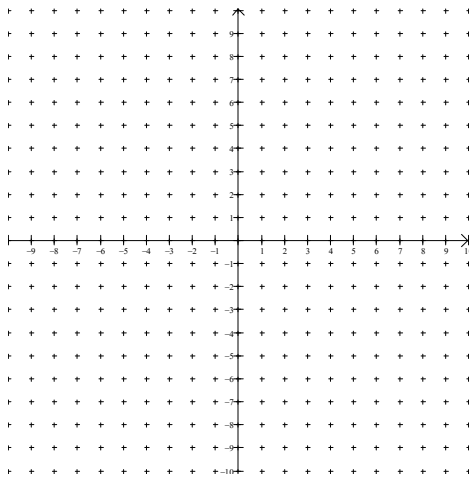
Directions: Complete this packet in the last week of summer to refresh your memory about Precalc A and B topics in order to be ready for the beginning of school. It will be collected at the end of the first week of class. Feel free to work together with others.

1. Solve:  $\sqrt{\frac{x+3}{x-1}} - 6\sqrt{\frac{x-1}{x+3}} = 1$

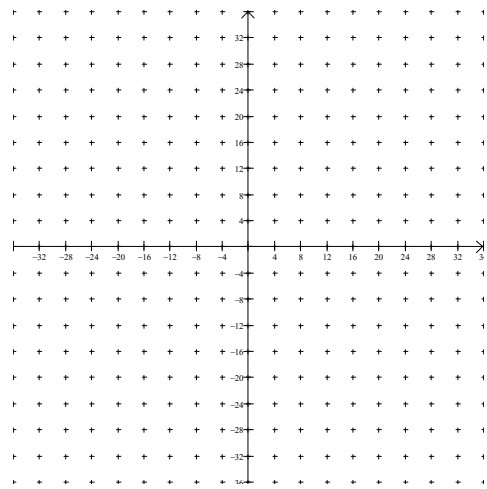
2. Simplify:  $\frac{b - \frac{x^2(b-x)}{b^2+x^2}}{b - \frac{bx-x^2}{b}}$

3. Simplify:  $\frac{a^2 + \frac{1}{a}}{1 - \frac{a}{1 - \frac{a}{a-1}}}$

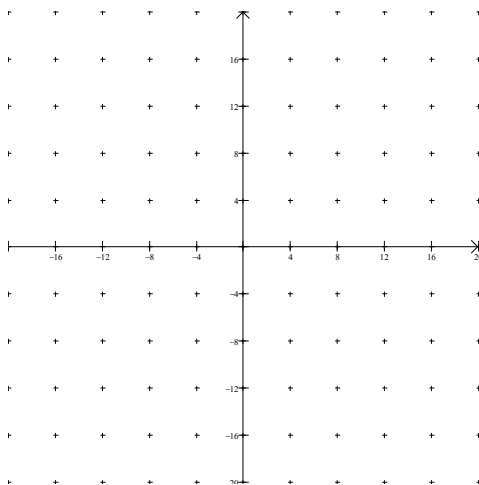
4.  $f(x) = x^{2/3}$



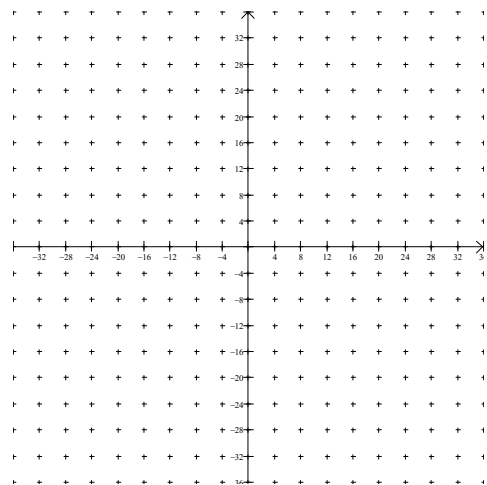
$f(x) = x^{3/5}$



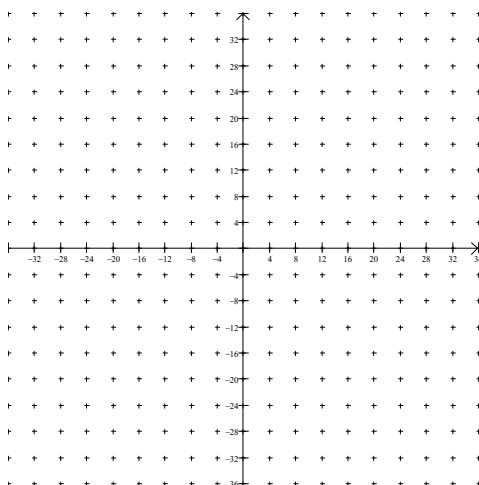
$f(x) = x^{3/4}$



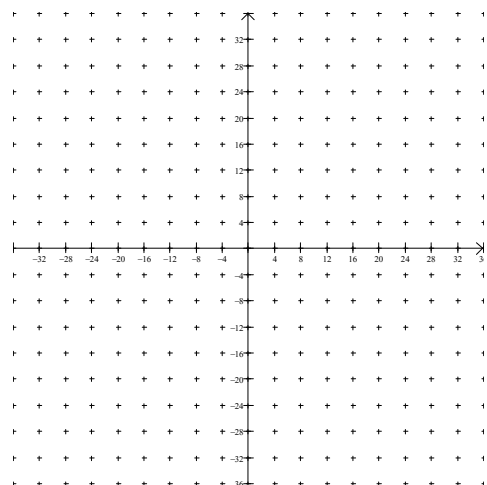
$f(x) = x^{5/3}$



$f(x) = x^{5/2}$



$f(x) = x^{4/3}$



## Deriving the Trig Identities Algebraically

Begin with the following identity, which you should have memorized:

$$(1) \cos(x - y) = \cos x \cos y + \sin x \sin y$$

Using (1), derive:

$$(2) \cos(x + y) =$$

Using  $\sin \theta = \cos\left(\frac{\pi}{2} - \theta\right)$  and (2), derive:

$$(3) \sin(x - y) =$$

Using (3), derive:

$$(4) \sin(x + y) =$$

Using (1) and (3) and some algebra, derive:

$$(5) \tan(x - y) =$$

Using (5), derive:

$$(6) \tan(x + y) =$$

Using (4), derive:

$$(7) \sin 2x =$$

Using (2), derive

$$(8) \cos 2x =$$

and then write it in two additional ways, first using just sines and then using just cosines

$$(9) \cos 2x =$$

$$(10) \cos 2x =$$

Using (6), derive:

$$(11) \tan 2x =$$

Using (9), derive:

$$(12) \sin^2 x =$$

Using (10), derive:

$$(13) \cos^2 x =$$

Using (12) and (13), derive:

$$(14) \tan^2 x =$$

Take the square root of both sides of (12) and then substitute  $\frac{x}{2}$  in for  $x$  to get:

$$(15) \sin \frac{x}{2} =$$

Take the square root of both sides of (13) and then substitute  $\frac{x}{2}$  in for  $x$  to get:

$$(16) \cos \frac{x}{2} =$$

Using (15) and (16), derive:

$$(17) \tan \frac{x}{2} =$$

Multiply the numerator and denominator under the radical by the conjugate of the numerator in (17):

$$(18) \tan \frac{x}{2} =$$

Multiply the numerator and denominator under the radical by the conjugate of the denominator in (17):

$$(19) \tan \frac{x}{2} =$$

5. The endpoints of the diameter of circle P are at  $(-1, 6)$  and  $(11, -10)$ . Find the equation of circle P. Then find the equation of the line that is tangent to the circle at the point  $(13, 4)$ .

6. Solve:  $\sqrt{6x+7} - \sqrt{5x+1} = \sqrt{4x-11}$

7. Solve:  $\frac{12x^2 - 16x - 60}{-5x - 3x^2} \cdot \frac{18x^2 + 21x + 6}{6x^2 - 54} > 0$

8. Solve:  $\frac{2x-11}{x^2-5x+4} - \frac{x-6}{x^2-3x-4} = \frac{3x-15}{x^2-1}$

9.  $e^{2x} - 5e^x - 6 = 0$

10.  $\log_7 2 + 2\log_7 x = \log_7(5x+3)$

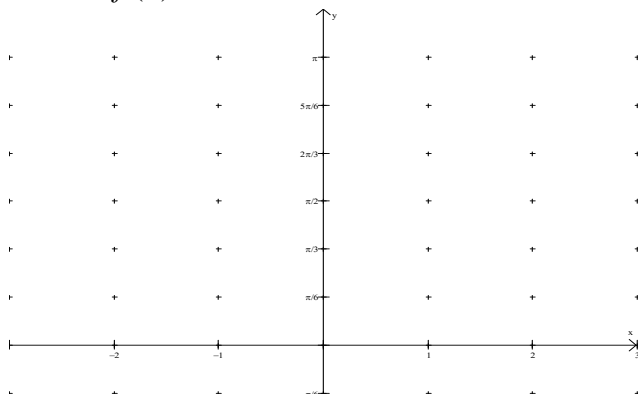
11.  $\log_3(x^2 - 8x) = 2$

12.  $\log_{10}(x^2 + 3x) + \log_{10}(5x) = 1 + \log_{10}(2x)$

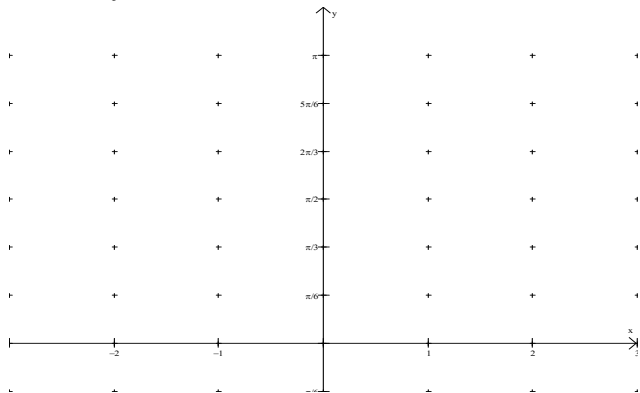
13.  $\sqrt[3]{\frac{8^{x+1}}{16^x}} = 32$

Sketch a graph of the following functions

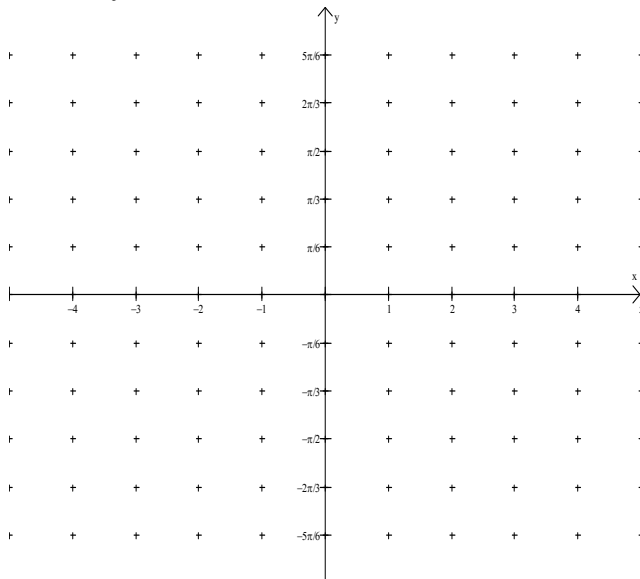
14.  $f(x) = \arccos x$



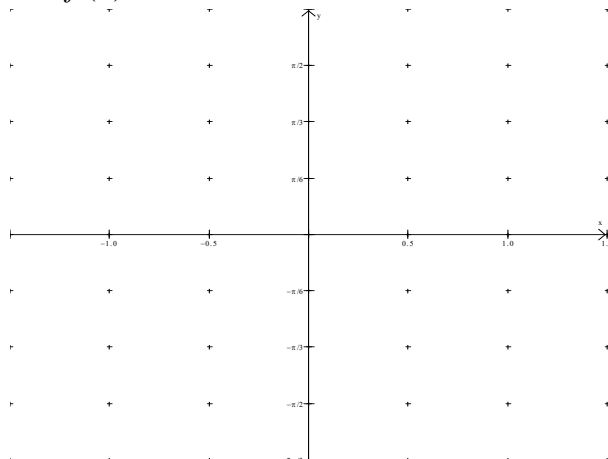
15.  $f(x) = \arcsin x$



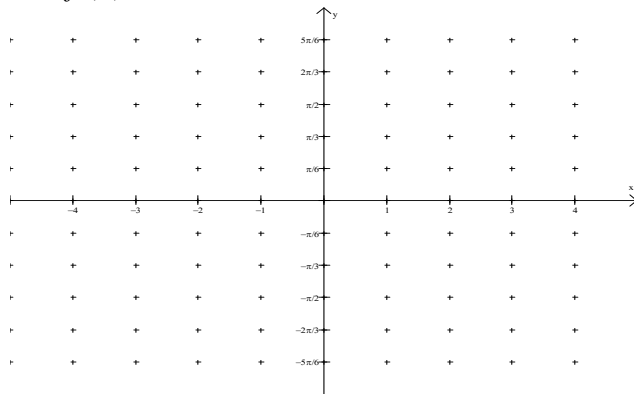
16.  $f(x) = \arctan x$



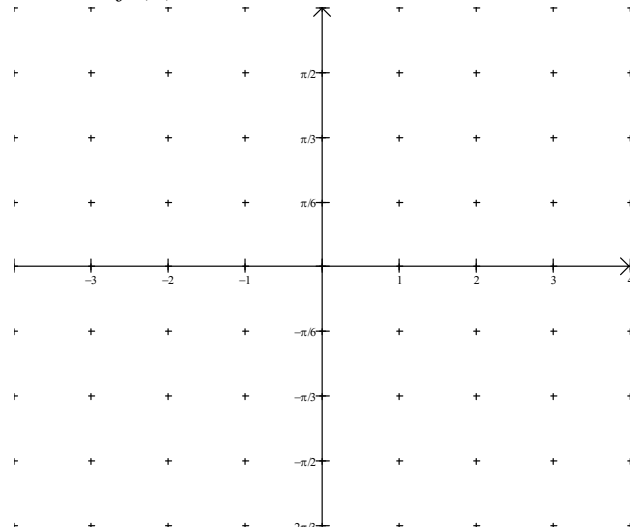
17.  $f(x) = \arccsc x$



18.  $f(x) = \operatorname{arccot} x$



19.  $f(x) = \operatorname{arccsc} x$

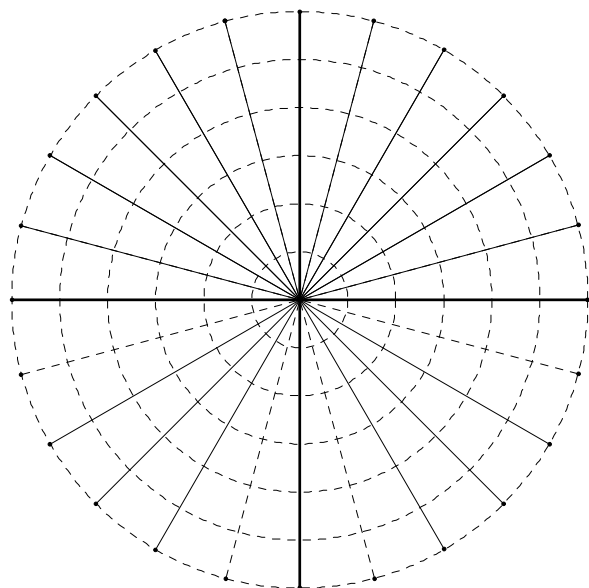
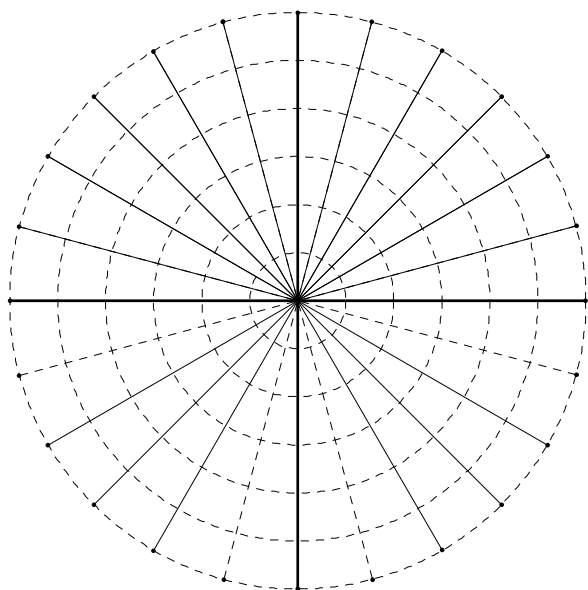




20. Compute:  $\sec\left(2\arccos\left(-\frac{4}{5}\right) + \arctan\left(\frac{8}{15}\right)\right) =$

21. Graph:  $r = 3 + 2\cos\theta$

$r = -1 + 4\cos\theta$



22. A certain population of bacteria is doubling every 24 minutes. If there were 500 bacteria at time  $t = 0$ , how many bacteria will there be 12 hours later? (Write a function that gives the number of bacteria in terms of  $t$ , the number of hours elapsed.)

23. Solve:  $2 \sin^2 x \cos x + 1 = 2 \sin x \cos x + \sin x$

24. Solve:  $11 \sec^2 x + 39 \sec x + 27 + 7 \tan^2 x = 0$

25. Prove the following trigonometric identities:

a. 
$$\frac{\sec^2 x - 6 \tan x + 7}{\sec^2 x - 5} = \frac{\tan x - 4}{\tan x + 2}$$

b. 
$$\csc^6 x - \cot^6 x = 1 + 3 \csc^2 x \cot^2 x$$

c. 
$$\cos x + \cos 2x + \cos 3x = \cos 2x(1 + 2 \cos x)$$

26. Let  $f(x)=\{(3,5),(2,4),(1,7)\}$ ,  $g(x)=\sqrt{x-3}$ ,  $h(x)=\{(3,2),(4,3),(1,6)\}$ , and  $k(x)=x^2+5$   
Determine each of the following:

a.  $(f + h)(1) =$       b.  $(k - g)(5) =$       c.  $(f \circ h)(3) =$       d.  $(g \circ k)(7) =$

e.  $f^{-1}(x) =$

f.  $k^{-1}(x) =$

g.  $\frac{1}{f(x)} =$

h.  $(kg)(x) =$

27. Simplify:  $\frac{4xy^{-2}}{12x^{-\frac{1}{3}}y^{-5}}$

28. Determine points of intersection of parabola  $y = x^2 + 3x - 4$  and line  $y = 5x + 11$