

## AP Calculus Summer Packet

Simplify using only positive exponents.

1.  $-5^{-x}$

2.  $\frac{\frac{1}{2}(2x+5)^{-3/2}}{\frac{3}{2}}$

3.  $2\left(\frac{2}{2-x}\right)\left(\frac{-2}{(2-x)^2}\right)$

4.  $(16x^2y)^{3/4}$

5.  $-\left(\frac{x^{1/2}}{2}\right)\sin\sqrt{x}$

6.  $\frac{\sqrt{4x-16}}{\sqrt[4]{(x-4)^3}}$

Find the domain of the following functions. Make sure to use interval notation.

7.  $y = \frac{x^2 - 4}{2x + 4}$

8.  $y = \frac{x^2 + 8x + 12}{\sqrt[4]{x + 5}}$

Factor completely.

9.  $x^5 + 11x^3 - 80x$

10.  $2x^2 + 50y^2 - 20xy$

11.  $(x-3)^2(2x+1)^3 + (x-3)^3(2x+1)^2$

Describe, in words, the transformations that would take place to  $f(x)$  in each of the follow.

12.  $f(x) - 3$

13.  $f(x - 3)$

14.  $-f(x + 5)$

15.  $6f(x) + 3$

16.  $f(2x)$

Solve each equation by factoring or using the quadratic formula.

17.  $7x^2 - 3x = 0$

18.  $4x(x-2) - 5x(x-1) = 2$

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

20.  $2x^2 - (x+2)(x-3) = 12$

21.  $x + \frac{1}{x} = \frac{13}{6}$

22.  $x - 10\sqrt{x} = -9$

Find the equations of all vertical ( $x=?$ ) and horizontal ( $y=?$ ) asymptotes (if they exist).

23.  $y = \frac{x}{x+4}$

24.  $y = \frac{x^3 + 5}{x^2 - 1}$

25.  $y = \frac{x+4}{x^2 + 9}$

Simplify the following.

26.  $\frac{x}{x - \frac{1}{2}}$

27.  $\frac{x - \frac{1}{x}}{x + \frac{1}{x}}$

28.  $\frac{x^{-3} - x}{x^{-2} - 1}$

If  $f(x) = x^2$ ,  $g(x) = 2x - 1$ ,  $h(x) = 2^x$ , find the following.

29.  $f(g(2))$

30.  $g(f(2))$

31.  $g(f(h(1/2)))$

Solve for x.

32.  $\frac{2}{3} - \frac{5}{6} = \frac{1}{x}$

33.  $x + \frac{6}{x} = 5$

34.  $\frac{x-5}{x+1} = \frac{3}{5}$

Solve for x on the interval  $[0, 2\pi)$ .

35.  $\sin x = \frac{1}{2}$

36.  $2 \sin x \cos x + \sin x = 0$

37.  $\sin^2 x + 4 + \cos^2 x = x$

Answer the following questions over a variety of topics.

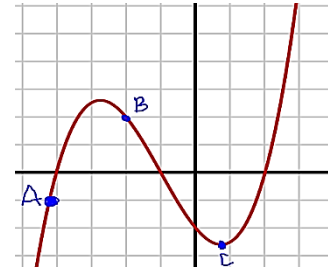
38. Let f be a linear function where  $f(2) = -5$  and  $f(-3) = 1$ . Find  $f(x)$  and write in point-slope form.

39. Find an equation for the line, in point-slope form, that contains  $(5, 1)$  and is perpendicular to  $6x - 3y = 2$ .

40. Use the table to calculate the average rate of change from  $t=1$  to  $t=3$ .

t	0	1	2	3
x(t)	8	7	5	1

41. Order the points A, B, and C, from least to greatest, by their rates of change.



42. Find the points of intersection in the graphs of  $y = x - 1$  and  $y^2 = 2x + 6$ .

43. Rewrite as a single logarithmic expression:  $\frac{1}{2} \ln(x-3) + \ln(x+2) - 6 \ln x$ .

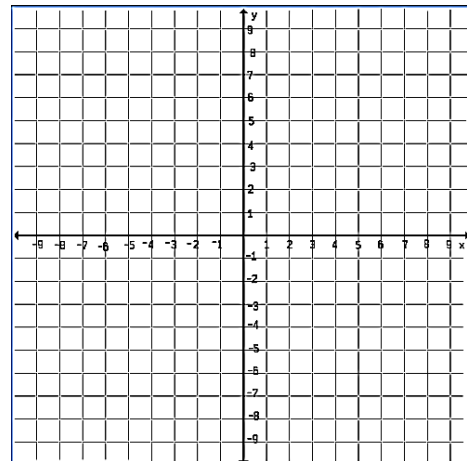
Evaluate the following:

44.  $\sin\left(\frac{7\pi}{6}\right)$

45.  $\sec\left(-\frac{2\pi}{3}\right)$

46.  $\tan\left(\frac{\pi}{2}\right)$

47. Sketch a graph of the piecewise function  $f(x) = \begin{cases} x^2 - 5, & x < -1 \\ 0, & x = -1 \\ 6 - 4x, & x > -1 \end{cases}$



Use the graph of  $f(x)$  to the right to find the following.

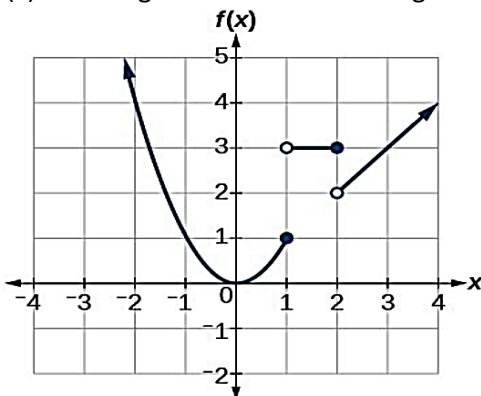
48.  $f(2) =$

49.  $f(x) = 2$

$x =$

50.  $f(x) = 1$

$x =$



Solve the following inverse trig functions.

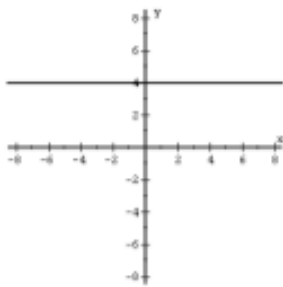
51.  $\tan(\pi/4) = 1$

Therefore,  $\tan^{-1}(1) = \underline{\hspace{2cm}}$  &  $\arctan(1) = \underline{\hspace{2cm}}$

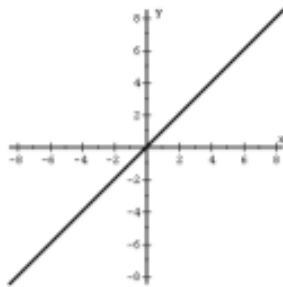
52.  $\sin^{-1}(1/2) = \underline{\hspace{2cm}}$  &  $\arcsin(1/2) = \underline{\hspace{2cm}}$

Know all of the following graphs of basic parent functions:

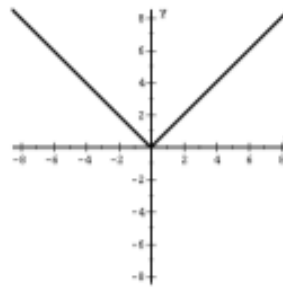
## PARENT FUNCTIONS



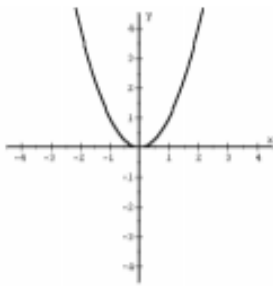
$f(x) = a$   
**Constant**



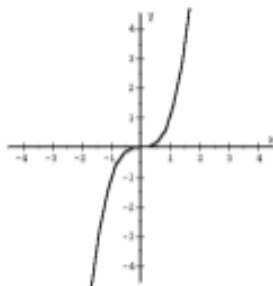
$f(x) = x$   
**Linear**



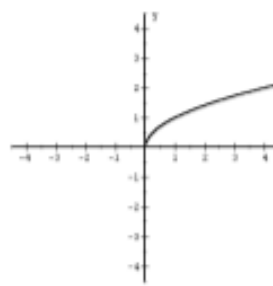
$f(x) = |x|$   
**Absolute Value**



$f(x) = x^2$   
**Quadratic**



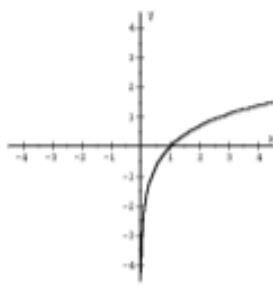
$f(x) = x^3$   
**Cubic**



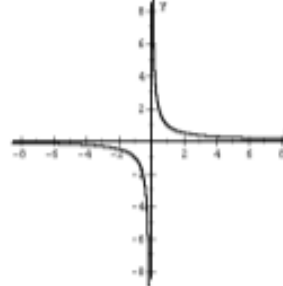
$f(x) = \sqrt{x}$   
**Square Root**



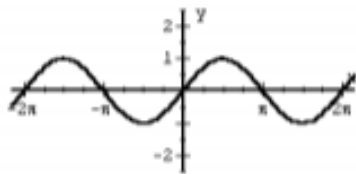
$f(x) = a^x$   
**Exponential**



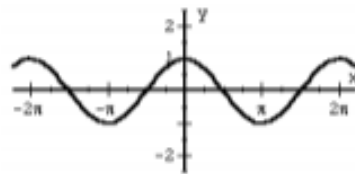
$f(x) = \ln x$   
**Logarithmic**



$f(x) = \frac{1}{x}$   
**Reciprocal**

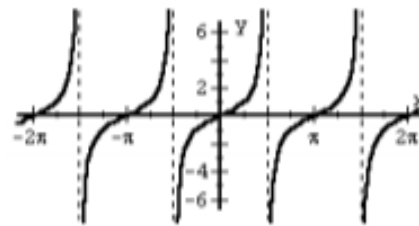


$f(x) = \sin x$



$f(x) = \cos x$

**Trigonometric Functions**



$f(x) = \tan x$