

**Math Department: Summer Assignment for Students Entering Calculus**

The purpose of this assignment is to keep your math skills “fresh” over the summer. The assignment will be checked when you return to school. A quiz will be given on this material after classes begin.

If you would like additional practice, or tutorials on problems similar to those below, visit [www.math.com](http://www.math.com) (the most helpful categories will most likely be the “Algebra,” “Trigonometry” & “Calculus” categories). Also, you can refer to your notebook from previous math classes if you need additional help.

Below, show work to indicate how you got your answer; do so without the use of a calculator.

**Simplifying Expressions**

1.  $(3x^2y)(-4xy^3)$

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

3.  $(2x+3)^2$

4.  $\frac{1}{\sqrt{3}}$

5.  $81^{\frac{-1}{2}} + 3^{-2} + 27^{\frac{-2}{3}}$

6.  $(8x^{-3})^{-2}$

7.  $\left(-\frac{1}{2}x^{-3}\right)^3$

8.  $(2a+b)^3$

9.  $\frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{b} - \frac{1}{a}}$

10.  $\frac{\frac{x}{x-1} - \frac{x}{x+1}}{\frac{x^2-1}{4x}}$

11.  $\frac{3}{(x-2)} - \frac{4}{(x+2)}$

**Solving Equations** (Remember to reject any solutions that are restrictions on the variable.)

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

13.  $\frac{x^2}{x-2} = \frac{4}{x-2}$

14.  $\sqrt{5x+39} = x-9$

**Use The Following Functions To Find The Values.**

$$f(x) = -2x + 1 \quad g(x) = x^2$$

15.  $f(2)$

16.  $f(g(2))$

17.  $f(g(x))$

18.  $g(f(x))$

**Solving Systems**

19. By Substitution

$$x + 2y = 6$$

$$2x + 6y = 5$$

20. By Elimination

$$2x + 5y = 10$$

$$3x + 4y = 12$$

**Sketch the following functions by translating the function's parent graph.**

21.  $f(x) = x^2 + 4$

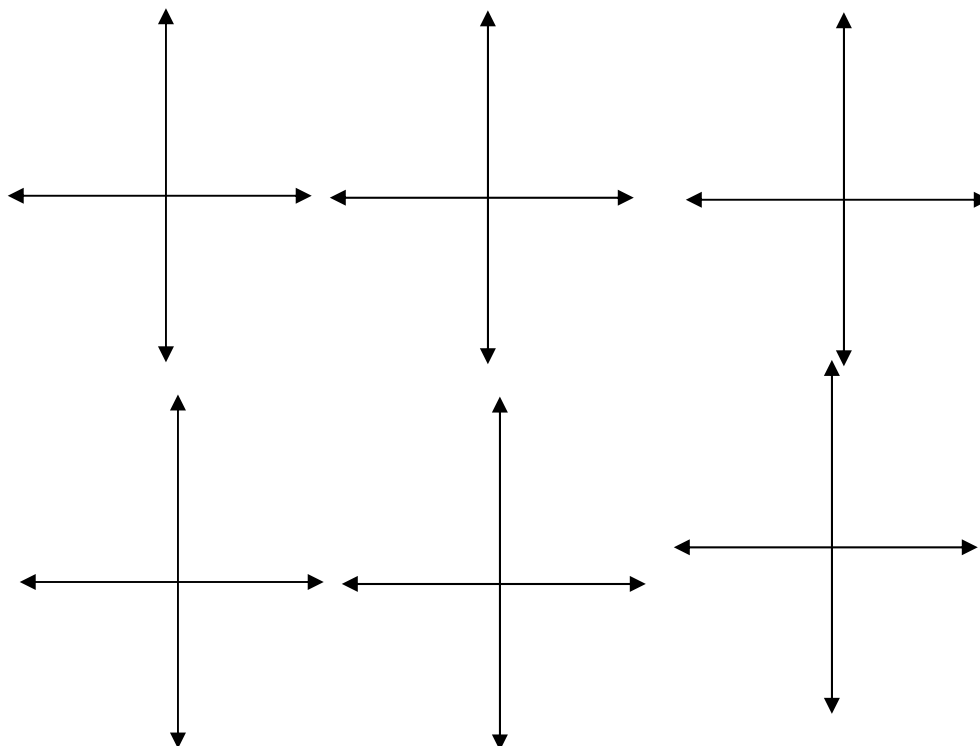
22.  $f(x) = 9 - x^2$

23.  $f(x) = x^3 + 1$

24.  $f(x) = |x - 1|$

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

26.  $f(x) = \frac{1}{x - 2}$



## Trigonometry

27. Evaluate:  $\tan\left(\frac{5\pi}{4}\right) + \sin\left(\frac{11\pi}{6}\right) \cdot \sin\left(\frac{-5\pi}{3}\right)$  (do this problem without a calculator)

28. If  $f(x) = \cos 2x + \sin x$ , find  $f\left(\frac{\pi}{4}\right)$ . (no calculator)

29. If  $f(x) = \sin 2x$ , find  $f\left(\frac{3\pi}{2}\right)$ . (no calculator)

30. If  $f(x) = \cos 2x \cdot \sin x$ , find  $f\left(\frac{\pi}{6}\right)$ . (no calculator)

31. If  $f(x) = \cos 2x \sin x$ , find  $f\left(\frac{\pi}{2}\right)$ . (no calculator)

32. If  $\cos A = .6820$ , find the measure of  $A$ . (round answer to nearest tenth) (calculator allowed)

33. A ramp leaning against a wall makes an angle of  $12^\circ$  with the level ground. If the ramp measures 19 feet, how far away is the bottom of the ramp from the bottom of the wall?  
(Express answer to the nearest tenth of a foot) (calculator allowed)

34. Give the double angle formulas for  $\sin 2x$  and  $\cos 2x$

35. What is the Pythagorean Identity that involves  $\sin x$  and  $\cos x$ ?

## Even & Odd Functions

36. Identify and show if the following functions are even, odd, or neither:

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

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

c.  $f(x) = x^3 + 9$

## Limits

37. For  $f(x) = \frac{4x+1}{2x+6}$ , find

a.  $\lim_{x \rightarrow 3} f(x)$

b.  $\lim_{x \rightarrow \pm \infty} f(x)$

38. If a function has a hole at (2,5), may we still find the limit as  $x \rightarrow 2$ ? YES / NO

39. For  $f(x) = \frac{x^2 - 81}{x + 9}$ , find

a. Find  $f(10)$

b.  $\lim_{x \rightarrow 9} f(x)$

c.  $\lim_{x \rightarrow -9} f(x)$

40.  $\lim_{x \rightarrow 3^+} \frac{1}{x-3}$

## ANSWERS

1.  $-12x^3y^4$

2.  $\frac{8x^6}{27y^3}$

3.  $4x^2 + 12x + 9$

4.  $\frac{\sqrt{3}}{3}$

5.  $\frac{1}{3}$

6.  $\frac{x^6}{64}$

7.  $-\frac{1}{8x^9}$

8.  $8a^3 + 12a^2b + 6ab^2 + b^3$

9.  $\frac{b+a}{a-b}$

10.  $\frac{2x}{(x^2-1)^2}$

11.  $\frac{-x+14}{(x-2)(x+2)}$

12.  $\left\{-\frac{1}{3}, \frac{5}{2}\right\}$

13.  $x = \pm 2$ , reject 2, so  $x = -2$

14.  $x = 21$ ,  $x = 2$

15.  $-3$

16.  $-7$

17.  $-2x^2 + 1$

18.  $4x^2 - 4x + 1$

19.  $\left\{13, -\frac{7}{2}\right\}$

20.  $\left\{\frac{20}{7}, \frac{6}{7}\right\}$

21. The graph will be shown in class

22. The graph will be shown in class

23. The graph will be shown in class

24. The graph will be shown in class

25. The graph will be shown in class

26. The graph will be shown in class

27.  $1 - \frac{\sqrt{3}}{4}$

28.  $\frac{\sqrt{2}}{2}$

29.  $0$

30.  $\frac{1}{4}$

31.  $-1$

32.  $47.0^\circ$

33. 18.6 ft

34.  $\sin 2x = 2 \sin x \cos x, \cos 2x = \cos^2 x - \sin^2 x = 2 \cos^2 x - 1 = 1 - 2 \sin^2 x$

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

36. a. neither b. even c. neither

37. a.  $13/12$  b. 2

38. yes

39. a. 1 b. 0 c. -18

40. + infinity