

## CONGRATULATIONS! YOU MADE IT TO CALCULUS!!!

*I am really looking forward to next year. Your senior year!  
This is the longest assignment that you will receive in Calculus.*

*Hint: You will want to do a little at a time.*

*\*\*These problems will be used as a pre-assessment. They will not be graded for accuracy, but will be graded on completion. However, these are topics that will not be covered in class, so make sure that you understand them. This will give your teacher a baseline for where YOU are at before the class begins. There is no need to copy answers from someone else. Your teacher wants to see what you know, not what someone else knows. You might need to refer to YouTube to look up a topic that you forgot how to do. These will be collected and you will receive a grade the first day of class for the completion of this assignment and a treat!!!*

*This should help you review your Algebra and Trig techniques. If you are really at a loss please call me with the question. 636-284-1084*

### Summer Worksheet

1) Simplify: (a)  $\frac{x^2 - 2x - 8}{x^3 + x^2 - 2x}$  (b)  $\frac{\frac{1}{x} - \frac{1}{5}}{\frac{1}{x^2} - \frac{1}{25}}$  (c)  $\frac{9 - x^{-2}}{3 + x^{-1}}$

2) Rationalize the denominator: (a)  $\frac{2}{\sqrt{3} + \sqrt{2}}$

3) Write each of the following expressions in the form  $ca^pb^q$  where c, p and q are numbers.

(a)  $\frac{(2a^2)^3}{b}$  (b)  $\sqrt{9ab^3}$  (c)  $\frac{a\left(\frac{2}{b}\right)}{\frac{3}{a}}$  (d)  $\frac{a^{-1}}{(b^{-1})\sqrt{a}}$  (e)  $\left(\frac{a^{\frac{2}{3}}}{b^{\frac{1}{2}}}\right)^2 \left(\frac{b^{\frac{3}{2}}}{a^2}\right)$

4) Solve for x (do not use a calculator!):

(a)  $\frac{1}{3} = 3^{2x+2}$  (b)  $\log_2 x = 3$  (c)  $\log_3 x^2 = 2\log_3 4 - 4\log_3 5$

5) Simplify: (a)  $\log_2 5 + \log_2(x^2 - 1) - \log_2(x - 1)$  (b)  $3^{2\log_3 5}$

6) Simplify: (a)  $\log\left(\frac{1}{10^x}\right)$  (b)  $2\log\sqrt{x} + 3\log x^{\frac{1}{3}}$

7) Solve for x. (a)  $3\sin^2 x = \cos^2 x$ ;  $0 \leq x < 2\pi$  (b)  $\cos^2 x - \sin^2 x = \sin x$ ;  $-\pi < x \leq \pi$

8) Solve the following equations for the indicated variable:

(a)  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ , for a (b)  $2x - 2yd = y + xd$ , for d

9) For the equations, complete the square and reduce to the standard form

$$y - b = A(x - a)^2.$$

$$3x^2 + 3x + 2y = 0$$

10) Factor completely and solve.

(a)  $x^6 - 16x^4 = 0$  (b)  $4x^3 - 8x^2 - 25x + 50 = 0$  (c)  $8x^3 + 27 = 0$

11) Without using a calculator, evaluate the following:

(a)  $\cos 210^\circ$  (b)  $\sin \frac{5\pi}{4}$  (c)  $\tan^{-1}(-1)$  (d)  $\tan \frac{7\pi}{6}$  (e)  $\cos \frac{9\pi}{4}$  (f)  $\sin^{-1} \frac{\sqrt{3}}{2}$

12) Solve the equations: (a)  $4x^2 + 12x + 3 = 0$  (b)  $2x + 1 = \frac{5}{x - 2}$

13) Find the remainder by long division:  $x^5 - x^4 + x^3 + 2x^2 - x + 4$  by  $x^3 + 1$

14) Find the remainder by synthetic division:  $x^5 - 4x^4 + x^3 - 7x + 1$  by  $x + 2$

15) The equation  $12x^3 - 23x^2 - 3x + 2 = 0$  has a solution  $x=2$ . Find all other solutions.  
Hint: You might want to do synthetic division!

16) Solve the inequalities: (a)  $x^2 + 2x - 3 \leq 0$  (b)  $\frac{2x - 1}{3x - 2} \leq 1$

17) Solve for x:  $|-x + 4| \leq 1$

18) Determine the equations of the following lines:

(a) the line through  $(-1, 2)$  and perpendicular to the line  $2x - 3y + 5 = 0$

(b) the line through  $(2, 3)$  and the midpoint of the line segment from  $(-1, 4)$  to  $(3, 2)$

19) Find the point of intersection of the lines:  $3x - y - 7 = 0$  and  $x + 5y + 3 = 0$

20) Find the equation of the circle: the circle with center (1,2) that passes through the point (-2,-1)

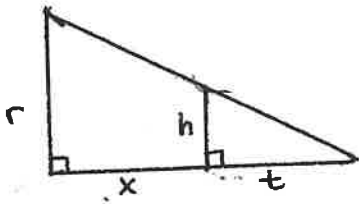
21) Find the domain of the functions: (a)  $f(x) = \frac{3x+1}{\sqrt{x^2+x-2}}$  (b)  $f(x) = \frac{5x-3}{2x+1}$

22) Write as a single equation in x and y:  $x = t + 1$  and  $y = t^2 - t$

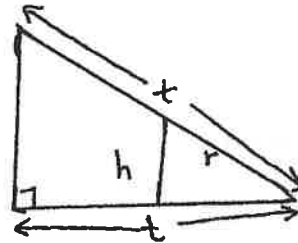
23) Find the inverse of the function:  $f(x) = \frac{x+2}{5x-1}$

24) Express x in terms of the other variables in the picture.

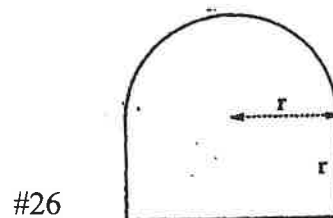
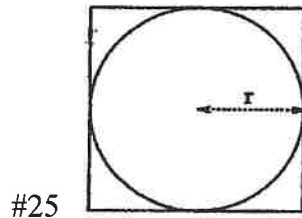
(a)



(b)



25) Find the ratio of the area inside the square but outside the circle to the area of the square in the picture below.



26) Find a formula for the perimeter of a window of the shape in the picture above.

27) Two cars start moving from the same point. One travels south at 100km/hour, the other west at 50 km/hour. How far apart are they two hours later? Hint:  $d = rt$ !

28) A kite is 100m above the ground. If there are 200m of string out, what is the angle between the string and the horizontal? (Assuming that the string is perfectly straight.)