Calculus Name:_____

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Summer Math Packet 2017

Completed by Thursday, August 24, 2017

Go to the BTW website (http://btw.tulsaschools.org/) then click the summer assignments (beach ball) and choose the course that you are enrolled in for the 2016-17 school year.

Helpful websites:

http://patrickjmt.com/
Free site with video lectures

http://www.khanacademy.org/
Free site with video lectures

http://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx
Free site with notes and problems

www.pearsonsuccessnet.com
Site from textbook publisher Pearson (Only available to students who have access from prior years)

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This practice is divided into four sections:

1. Simplify expressions
2. Evaluate functions
3. Solve equations
4. Basic functions and operations

It is crucial that you do not use a calculator for any of these questions.

1. Simplify each expression

a. $\dfrac{x^2 - 4x}{x^2 - 7x + 12}$

b. $2\ln(x + 3) - \ln(x)$

c. $\dfrac{x^3}{x^{-5}}$

d. $\dfrac{4 - x}{x^2 - 16}$

e. $\dfrac{x}{\sqrt{x}}$

f. $\dfrac{2}{\sqrt{3}}$

g. $\dfrac{5}{x} - \dfrac{2}{x}$

h. $\dfrac{a^{-1}}{a^{-2}\sqrt{a}}$

i. $\tan x \cos x$

j. $2\ln\left(\sqrt{1 - x}\right)$

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k. $sin^2 x + cos^2 x$

2. Evaluate each quantity and write in simplest form

Fill in this chart with the missing radian/degree measure:

Radians	$\frac{\pi}{6}$		$\frac{2\pi}{5}$				$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$
Degrees		240°		180°	120°	225°			

Radians	$\frac{\pi}{4}$		$\frac{7\pi}{3}$				$\frac{5\pi}{4}$	$\frac{5\pi}{12}$	$\frac{11\pi}{6}$
Degrees		135°		90°	270°	300°			

Find the <u>exact value</u> of the following

$sin\left(\frac{\pi}{2}\right)$ $cos\left(\frac{\pi}{2}\right)$ $tan\left(\frac{\pi}{2}\right)$

$sin\left(\frac{\pi}{3}\right)$ $cos\left(\frac{\pi}{6}\right)$ $tan\left(-\frac{3\pi}{4}\right)$

$sin\left(\frac{4\pi}{3}\right)$ $cot\left(\frac{\pi}{3}\right)$ $tan\left(\frac{2\pi}{3}\right)$

$cos\left(-\frac{\pi}{3}\right)$ $cos\left(\frac{7\pi}{4}\right)$ $sin\left(\frac{5\pi}{2}\right)$

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$\ln e^7$ $\ln 1$ $27^{\frac{2}{3}}$

$\sqrt{\frac{49}{121}}$ $\sqrt[3]{8}$ $16^{-\frac{1}{2}}$

e^0 $\ln\left(\sqrt{e}\right)$ $1^{4.2}$

3. Solve each equation/inequality for *x* (give exact values only; solve trig equations on $[0, 2\pi]$)

a. $3x + 2 = 8$

b. $4(x - 2) + 3x = -1$

c. $x^2 - 3x + 2 = 0$

d. $x^2 - 6x + 9 = 0$

e. $x^2 - 2x = 0$

f. $x^2 + 9 = 0$

g. $\frac{1}{x} + x = 4$

h. $\frac{2}{x+1} = \frac{x-2}{2}$

i. $\sqrt{x-1} - 5 = 0$

j. $3\cos x - 1 = 2$

k. $\frac{1}{3} = 3^{2x+2}$

l. $\tan x(2\cos x - 1) = 0$

m. $5^{x+1} = 25$

n. $\ln(x + 1) = 2$

o. $ln\left(e^{x}\right) = 4$

p. $lnx + 2lnx = 0$

q. $e^{2x-5} = 1$

r. $\log_3 x = \log_3 4 - \log_3 5$

s. $\sqrt{x+3} = x - 9$

t. $\frac{x^4 - 1}{x^3} = 0$

u. $(x + 3)(x - 3) > 0$

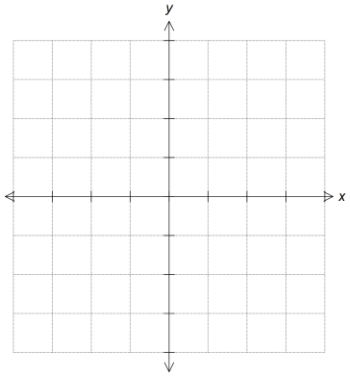
v. $\frac{x+2}{x} \geq 0$

4. Basic functions: graphs and operations

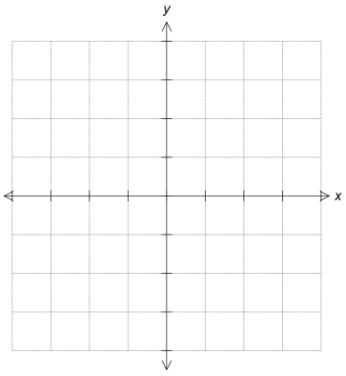
Calculus is a lot easier when you are familiar with several basic functions.
For each function listed below, you should be able to quickly and accurately:

- sketch its graph
- identify domain, range, intercepts, asymptotes…
- perform basic transformations (shifts, stretches, reflections)

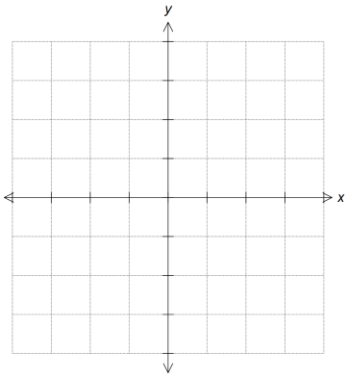
a. $y = x^2$



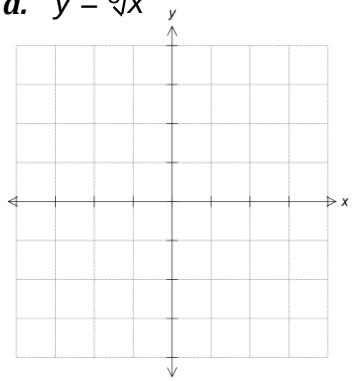
b. $y = x^3$



c. $y = \sqrt{x}$



d. $y = \sqrt[3]{x}$



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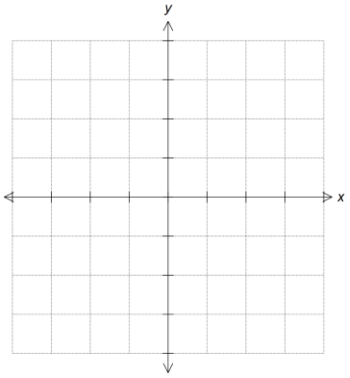
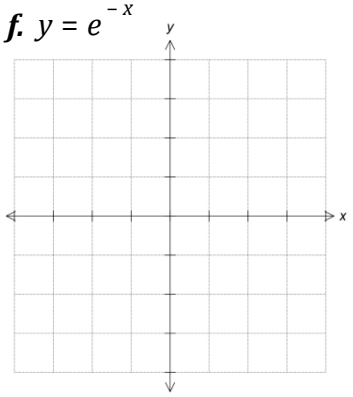
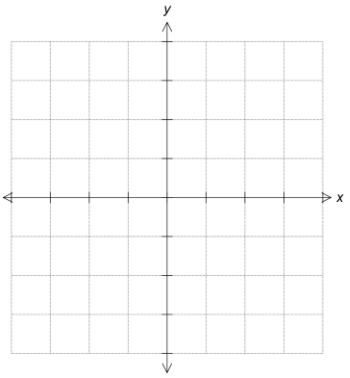
e. $y = e^x$



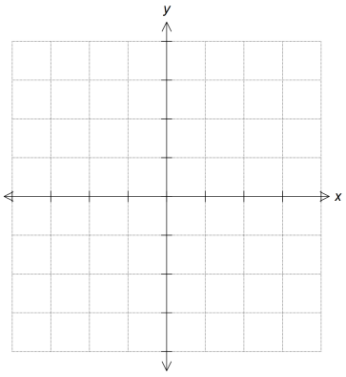
f. $y = e^{-x}$



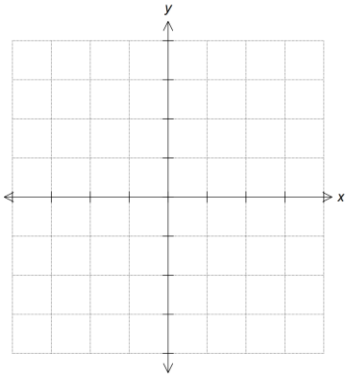
g. $y = \ln x$



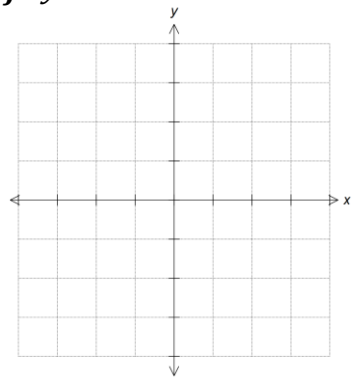
h. $y = \frac{1}{x}$



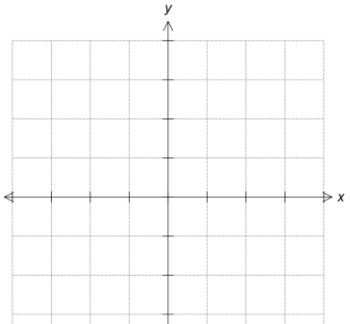
i. $y = |x|$



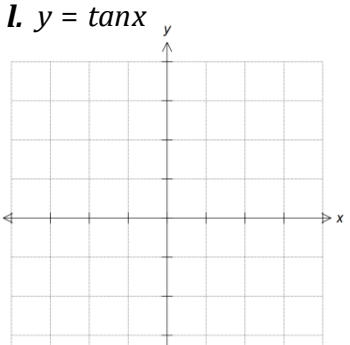
j. $y = \sin x$



k. $y = \cos x$



l. $y = \tan x$



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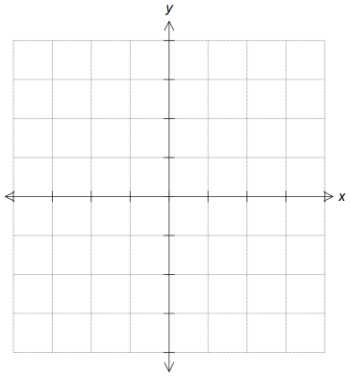
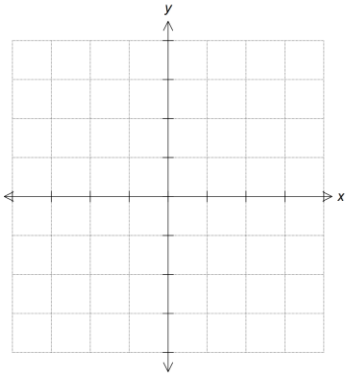
m. $y = \begin{cases} sinx & x < 0 \\ x^2 & x \geq 0 \end{cases}$



n. $y = \begin{cases} x + 1 & x < -1 \\ 2 - x & -1 < x \end{cases}$



Operations with functions

o. Find the inverse of each function. Is $f^{-1}(x)$ a function? Why? Why not?

$f(x) = \sqrt{x + 1}$ $f(x) = 5x - 2$ $f(x) = x^2 + 1$

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p. Given $f(x) = \sqrt{x + 1}$ *and* $g(x) = 3x + 1$ evaluate and simplify the following:

$g(a + b) =$

$f(x - 3) =$

$f(g(x)) =$

$g(f(x)) =$

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q. Linear functions: find the equation of a line given each condition

- The line with slope 2 passing through (-3,1)
- The line parallel to $3x - y + 1 = 0$ and passing through the origin
- The line that forms a 45° angle with the x-axis and passes through (1,2)

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- The line that is perpendicular to $y = \frac{1}{4}x + 1$ and is passing through (3,0)
- The line passing through points (-1,1) and (3,-1)
- The line with slope 2 that forms a triangle of area 12 with the positive x- and y-axis

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r. Find the domain of each function

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

$y = ln(x + 2)$ $y = tan(x)$ $y = cos(\pi x)$

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s. Find the equation of each vertical and horizontal asymptote (if any)

$f(x) = \frac{x + 2}{2x - 1}$ $f(x) = \frac{3x}{x^2 + x - 2}$

$f(x) = \frac{x^3 + 5x^2}{x^2 + 9}$ $f(x) = \frac{x + 4}{x^3 - 4x}$

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t. Describe (and graph) each transformation when compared to the parent graph:

$y = \sqrt{x - 2} + 3$ $y = sin(2x)$

$y = |x^2 - 4|$ $y = \frac{1}{x + 3}$

$y = (x - 5)^2 - 2$ $y = ln(-x)$

---------- **The End** ----------