AB Calculus
2017-2018 Summer Assignment

Name: ___________________________________

Directions: Complete this packet of review material.

- In order to be ready for your AB Calculus Course you should be able to complete these prerequisite exercises. Be prepared to turn in your solutions and supporting work during the first week of school in September. Use additional paper if necessary.
- You may work with other students. However, you must be prepared to brief/explain your solutions using the supporting work on these pages in September.
- Your supporting work should include the neat, well-organized steps that lead to your solution.
- An exam will be given in early September to confirm your understanding of the pre-calculus concepts including the concept of a limit.
- Contact Mr. Acker at (908) 835-1973 or email (preferably) racker@wmrhsd.org if you have questions regarding the instructions.

1. Given: $f(x) = x^2 - 3x + 4$, find the following:

a) $f(x+2)$

b) $f(x+2) - f(2)$

c) $\dfrac{f(x+\Delta x) - f(x)}{\Delta x}, \Delta x \neq 0$

2. Solve the inequalities. State your answer using <u>interval notation</u> using parentheses and brackets.

a) $2 \leq 4 - x < 10$

b) $|3x+1| \geq -4$

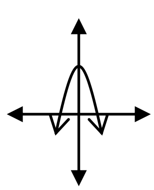
3. Let $f(x)=e^{-x}$ and $g(x)=\dfrac{x}{1+x}$, $x\neq -1$. Find the following and state the domain of each.

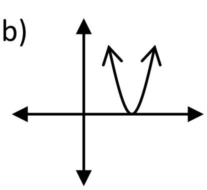
a) $f^{-1}(x)$ b) $(f\cdot g)(x)$ c) $(f\circ g)(x)$

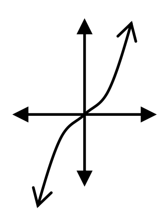
4. Let $g(0)=1$, $g(1)=-3$, $g(2)=5$, $g(7)=2$, $h(1)=7$, $h(2)=1$, $h(5)=0$. Evaluate:

a) $(g\circ h)(2)$ b) $(g^{-1}\circ h^{-1})(1)$ c) $(h^{-1}\circ g^{-1})(-3)$

5. For each of the following functions, state if they are even, odd, or neither. Explain.

a) 

b) 

c) 

6. For the following rational functions, state the equations of the vertical, horizontal, or slant asymptotes.

a) $f(x) = \dfrac{2x^2 + 1}{x^2 - 4}$ b) $f(x) = \dfrac{3x}{x^4 - 16}$ c) $f(x) = \dfrac{2x^2 + 11x + 15}{2x + 3}$

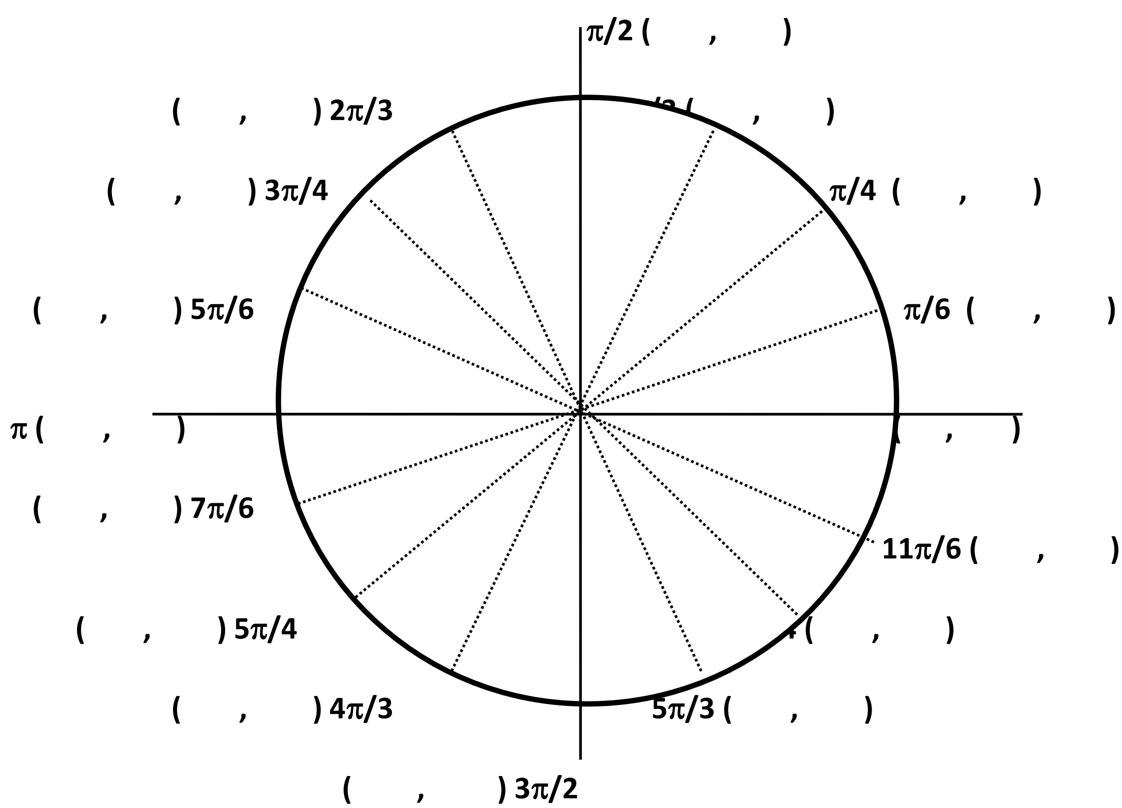
7. Let $\log_{10} P = x$, $\log_{10} Q = y$, and $\log_{10} R = z$. Express $\log_{10}\left(\dfrac{P}{QR^3}\right)^2$ in terms of *x*, *y*, and *z*.

8 Solve the equation: $9^{x-1} = \left(\dfrac{1}{3}\right)^{2x}$

9. Solve the equation: $\log_{27} x = 1 - \log_{27}(x - 0.4)$.

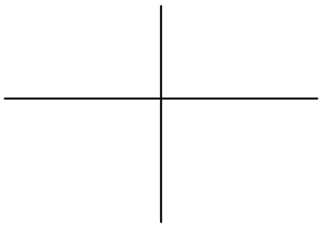
10. The function *f* is given by $f(x) = e^{(x-11)} - 8$. Find $f^{-1}(x)$ and its domain.

11. Fill in the coordinates (cos θ , sin θ) for the unit circle below using exact values.



12. Sketch θ in standard position and find <u>EXACT</u> values for the 6 trig functions of θ.

a) $\theta = -150°$



a. Sin θ =

b. Cos θ =

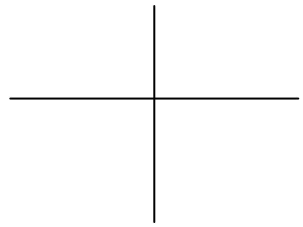
c. Tan θ =

d. Cot θ =

e. Sec θ =

f. Csc θ =

b) $\theta = \dfrac{7\pi}{3}$



Sin θ =

Cos θ =

Tan θ =

Cot θ =

Sec θ =

Csc θ =

13. Find the values of the other 5 trig functions under the given conditions.

a) $\sec\theta = \dfrac{6}{5}$ and $\tan\theta < 0$

b) $\tan\theta = -\dfrac{12}{5}$ and $\sin\theta > 0$

14. Express the following in terms of cos(x) and/or sin(x):

a) sin(2x)

b) cos(2x)

c) sin(x/2)

d) cos(x/2)

15. Identify the three Pythagorean Trigonometric Identities.

16. Solve the given equations on the interval $[0°, 360°)$.

a) $3\tan^2\theta - 1 = 0$

b) $2\cos(2x) + \sqrt{3} = 0$

c) $\sin^2 x + 2\cos x = 2$

17. Solve the given equations on the interval $[0, 2\pi)$.

a) $\sin x = \sqrt{3} - \sin x$ b) $\cot^2 x - 3\csc x + 3 = 0$ c) $3\sec^2 x = 4$

18. Solve the equation $2\cos^2(x) = \sin(2x)$ for $0 \leq x \leq \pi$ giving your answers in terms of π.

19. Evaluate each expression. Remember there is a restricted domain for inverses.

a) $\arctan\left(\sqrt{3}\right)$ b) $\arccos(1)$ c) $arc\csc\left(-\frac{2\sqrt{3}}{3}\right)$ d) $arc\cot(1)$

20. Find the following sums without calculator:

a) $\sum_{n=1}^{6}\left(n^2-n\right)$

b) $\sum_{n=1}^{4}\left(2+\frac{5}{2}n-\frac{3}{2}n^2\right)$

21. Complete the tutorial on Limits and Continuity (chapter 1 at website **http://www.calculus-help.com/tutorials**. Then define "limit" in your own words

22. From this online tutorial, identify the conditions required for a limit to exist.

23. From the online tutorial, list the conditions for continuity

24. Complete the table of values for each function. Determine if the limit exits based on your table of values. If the limit does exist, give its value. If the limit does not exist, state the reason why.

a) $\lim\limits_{x \to 3} \dfrac{|x-3|}{x-3}$

x	2.9	2.99	2.999	3.0001	3.001	3.01
$f(x)$						

b) $\lim\limits_{x \to 2} \begin{cases} x-1, & x \le 2 \\ 2x-3, & x > 2 \end{cases}$

x	1.9	1.99	1.999	2.001	2.01	2.1
$f(x)$						

25. Use the direct substitution method to evaluate the following limits. If the limit does not exist, state the reason why.

a) $\lim\limits_{x \to e} \dfrac{x}{\ln x}$

b) $\lim\limits_{x \to \frac{1}{4}} \dfrac{\tan \pi x}{2}$

c) $\lim\limits_{x \to 1} \arccos \dfrac{x}{2}$

26. Use a graphing method to evaluate the following limits. Sketch the graph. If the limit does not exist, state the reason why.

a) $\lim\limits_{x \to 8} \dfrac{\sqrt{x+1}}{x-4}$

b) $\lim\limits_{x \to 0} \cos \dfrac{1}{x}$

c) $\lim\limits_{x \to 2} \begin{cases} x^3, & x \ne 2 \\ 5, & x = 2 \end{cases}$

27. Use the cancellation (see tutorial) method to evaluate the following limits. If the limit does not exist, state the reason why.

a) $\lim\limits_{t\to -2}\frac{t^3+8}{t+2}$

b) $\lim\limits_{x\to 0}\frac{\frac{1}{5-x}-\frac{1}{5}}{x}$

28. Use the rationalization method (see tutorial) to evaluate the following limits. If the limit does not exist, state the reason why.

a) $\lim\limits_{x\to 4}\frac{\sqrt{x+5}-3}{x-4}$

b) $\lim\limits_{x\to 2}\frac{4-\sqrt{18-x}}{x-2}$

29. Find the following limits at infinity. If the limit does not exist, state the reason why.

a) $\lim\limits_{x\to \infty}\frac{4}{2x+3}$

b) $\lim\limits_{x\to \infty}\frac{2x^2-6}{(x-1)^2}$

c) $\lim\limits_{x\to \infty}\frac{4x^4}{x^2+1}$