AP Calculus AB Summer Packet   *Summer 2017*

Know the prerequisites and you'll be ready for Calculus! Feel free to email me at David_Robinson.k12.ca.us during the summer, if you have any questions. Please do the following problems, re-learn what you might have forgotten and be prepared to turn it in the first week of school. If you get stuck on any topic then look up the problem (or topic) online. There are many great tutorial websites. My absolute favorite math tutor is PatrickJMT (Go to patrickjmt.com or YouTube to find him).

Sincerely,

Mr. Robinson

I. Graphing Parent Functions

Stuff to Remember:
$-f(x)$ is $f(x)$ reflected over the x-axis
$f(-x)$ is $f(x)$ reflected over the y-axis
$f(x+c)$ is $f(x)$ translated -c units horizontally
$f(x)+c$ is $f(x)$ translated c units vertically
$|f(x)|$ is $f(x)$ with the negative y-values reflected over the x-axis
$f(|x|)$ is $f(x)$ with the positive x-values reflected over the y-axis

There are many parent graphs that you should know well and they are listed in the problems below. You should be able to **sketch** each of them quickly and accurately. In calculus, we analyze and use graphs often. You are expected to graph these problems without a calculator. **Graph the following problems:**

1. $y = x$ 2. $y = x^2$ 3. $y = x^3$ 4. $y = |x|$ 5. $y = \sqrt{x}$

6. $y = \sqrt[3]{x}$ 7. $y = \dfrac{1}{x}$ 8. $4x + 2y = 5$ 9. $y = (x+1)^2 - 3$ 10. $y = (x-2)^3$

These graphs might be new to you but they come up in Calculus (Google the graphs, if necessary):

11. $y = \sqrt{9 - x^2}$ 12. $y = |x^2 - 4|$

II. Factoring

Solve by factoring:
13. $2x^2 + 50 = 0$
14. $x^2 + 3x - 108 = 0$

III. Trigonometry – Basic Stuff

In Calculus, all angle measures and problems using trigonometry will be expressed in radians.

Triangle Trig: cos (x) = adjacent over hypotenuse
sin (x) = opposite over hypotenuse
tan (x) = opposite over adjacent

Identities:

Definitions

$$\tan x = \frac{\sin x}{\cos x}$$

$$\cot x = \frac{\cos x}{\sin x}$$

Reciprocals

$$\sin x = \frac{1}{\csc x} \qquad \cot x = \frac{1}{\tan x}$$

$$\cos x = \frac{1}{\sec x} \qquad \sec x = \frac{1}{\cos x}$$

$$\tan x = \frac{1}{\cot x} \qquad \csc x = \frac{1}{\sin x}$$

Pythagorean

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

$$\tan^2 x + 1 = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

Unit Circle:

- know all the radian values of all the major angles
- know all the x- and y- coordinates of all the major angles
- know that the x-coordinate is cosine and the y-coordinate is sine

We will have a quiz on the unit circle on the 2nd day of school. Be prepared!

Do the following problems:

15. Draw the complete unit circle using a technique you learned or from memory.

16. Write sin, cos and tan for $\theta = \frac{\pi}{6}$.

17. Write sin, cos and tan for $\theta = \frac{\pi}{2}$.

18. Write sin, cos and tan for $\theta = \frac{5\pi}{4}$.

19. Graph two periods of $2\cos 3\theta$.

20. Graph two periods of $\sin \frac{\pi x}{2}$.

IV. Random Simplifying

Random simplifying that you will need to be able to do in Chapter 2. If you do the algebra then the "*h*" should eventually cancel out. **Simplify the following problems:**

21. $\dfrac{\left[4(x+h)+3\right]-\left[4x+3\right]}{h} =$

V. Inverse, Composite, Exponential Equations, Log Equations:

22. Find the inverse function: If $f(x) = \dfrac{3}{x+2}$, then find $f^{-1}(x)$

23. Composite functions: If $f(x) = x^2 - 1$ and $g(x) = \sqrt{x}$, find $(f \circ g)(x)$ and $(g \circ f)(x)$

24. Exponents and logarithms: Solve $4^{x-2} = 3$

25. Exponents and Logarithms: Solve $3e^{4x} + 2 = 26$

26. Exponents and Logarithms: Solve $\ln(2x+1) = 1$

VI. Finding Vertical and Horizontal Asymptotes:

27. Find vertical and horizontal asymptotes: $f(x) = \dfrac{2x+1}{x-3}$

28. Find vertical and horizontal asymptotes: $f(x) = \dfrac{x+5}{x^2 - 3x - 4}$

All finished! Have a great summer and I look forward to collaborating with you soon!