

AP Calculus Summer Assignment – Due the first day of class – do all work on separate sheets of paper. **Rewrite each question, then answer each of the following!! Failure to do so will result in earning a 0 for the assignment.**

Simplify the following without a calculator

1.  $\tan\left(\frac{3\pi}{4}\right)$

2.  $\cos\left(\frac{5\pi}{6}\right)$

3.  $\sin\left(\frac{5\pi}{3}\right)$

4.  $\cot(\pi)$

5. State the equivalence for the following:

a.  $\sin(2x)$

b.  $\sin(x + y)$

c.  $\cos(x + y)$

d.  $\cos(2x)$  (there are three of these)

6. Write the **three** Pythagorean identities

7. Factor the following completely:

a.  $x^2 - 121$

b.  $16x^4 - 81$

c.  $x^3 - 64$

d.  $e^{2x} - 5e^x - 6$

e.  $2x^3 - 5x^2 + 50x - 125$

8. Solve for the variable in each of the problems – no calculator

a.  $\sqrt{3} \tan(2x) - \sqrt{3} = 0$

b.  $9\ln(4x-17) + 32 = 7$

c.  $2 \sin(4x) + 5 = 8$

d.  $4 \cos(5x) - 3 = -1$

e.  $7e^{5x-9} + 11 = 13$

f.  $\sin(x) - \cos(x) = 0$

g.  $\csc(x) - 1 = 1$

h.  $2x^4 = 54x$

9. Graph the following functions – state the domain and range as well

a.  $f(x) = \sqrt{16 - x^2}$

b.  $g(x) = \tan(x)$

c.  $y = \log_4(x - 2) + 3$

d.  $f(x) = \begin{cases} x - 3, & x < 1 \\ 5, & 1 \leq x < 3 \\ -x^2 + 2, & x \geq 3 \end{cases}$

e.  $h(x) = \frac{x-4}{x^2-3x-4}$

f.  $p(x) = \frac{5}{x^2+1}$

g.  $f(t) = e^t$

h.  $g(t) = 2^{-t}$

i.  $g(x) = x^{2/3}$

j.  $f(x) = \frac{|x|}{x}$

k.  $g(x) = \frac{x^2 - 3x - 4}{x - 4}$

l.  $h(x) = -2(x - 1)^3 + 5$

10. Write  $y = |x|$  as a piecewise function

11. Define the intermediate value theorem and extreme value theorem (if you don't know it, look it up).

12. Find the end-behaviors for each of the following functions:

a.  $f(x) = -x^4 + 5x + 9$

b.  $g(x) = 3(.2)^x + 5$

c.  $y = 3x + 2$

13. Find the vertical asymptote(s) (if any) for each function:

a.  $y = \cot(3x)$

b.  $f(x) = \log(7x-2)$

c.  $f(x) = \frac{x-2}{x^2-7x+10}$

d.  $g(x) = \sin\left(\frac{1}{x}\right)$

14. What is the relationship between the position function, the velocity function and the acceleration function? (again, if you do not know this, please look it up)

16. Evaluate the following without a calculator:

a.  $32^{3/5}$

b.  $\ln e$

c.  $\log_4 8$

d.  $\log 1$

e.  $\sqrt[4]{16^7}$

f.  $18^0$

g.  $e^{\ln 4}$

h.  $\ln(-1)$

i.  $27^{-2/3}$

17. Describe 4 different ways one can solve the equation:  $x^2 - 6x - 8 = 0$

## Expectations for AP Calculus BC

- Know your unit circle
- Know how to solve (linear, quadratic, exponential, logarithmic, trigonometric functions, systems)
- Know how to graph functions (linear, quadratic, rational, exponential, logarithmic, trigonometric, end-behavior, zeros/multiplicity, asymptotes)
- Know how to use your calculator
- Know everything about math