

## Summer Review Problems

For this course, you will need to know the following:

- How to graph equations
- Factor, combine, simplify, rearrange algebraic expressions
- Inverse Functions
- Trigonometric ratios
- Trig values at special angles
- Trig identities (Pythagorean, Double Angle)
- Logarithms
- Laws of exponents
- Laws of logs
- Laws of  $\ln$  and  $e$
- Formulas from Geometry

Work neatly! If I can't read it, I won't grade it. Show all work on a separate sheet of paper and "box" your final answer! You may only use a calculator when indicated.

1. Using the table of values given above, find the average rate of change for  $f$  on the interval  $(2, 5)$  and write an equation for the secant line passing through the corresponding points.

$x$	0	1	2	3	4	5	6
$f(x)$	-10	-8	-1	0	5	7	2

2. Find the equation of the line that passes through  $(2, -1)$  and is perpendicular to the line  $2x - 3y = 5$ .
3. Create a "Parent Functions Cheat Sheet" by graphing all of the following parent functions on a single piece of graph paper: (You may use a graphing calculator, if needed)

a.  $f(x) = x$

e.  $f(x) = \sqrt[3]{x}$

i.  $f(x) = e^x$

m.  $f(x) = \tan x$

b.  $f(x) = x^2$

f.  $f(x) = |x|$

j.  $f(x) = \ln x$

n.  $f(x) = \sec x$

c.  $f(x) = x^3$

g.  $f(x) = \frac{1}{x}$

k.  $f(x) = \sin x$

o.  $f(x) = \sin^{-1} x$

d.  $f(x) = \sqrt{x}$

h.  $f(x) = \frac{1}{x^2}$

l.  $f(x) = \cos x$

p.  $f(x) = \tan^{-1} x$

4. Graph  $y = \frac{2x}{x-4}$ . Label x- and y- intercepts and all vertical and horizontal asymptotes.

5. Suppose  $f(x) = \begin{cases} x - 1, & \text{if } x < 2 \\ \sqrt{x - 1}, & \text{if } x > 2 \end{cases}$ . Answer the following:

- $f(-3) =$
- $f(2) =$
- $f(10) =$
- Graph  $f(x)$

6. If  $f(x) = \frac{x}{x-1}$  and  $g(x) = \frac{1}{x-1}$ , find  $(f \circ g)(x)$  and  $(g \circ f)(x)$ .

7. Solve the following

- $4t^3 - 12t^2 + 8t = 0$
- $3\sqrt{x-2} - 8 = 8$
- $2 \ln 3x = 4$
- $\frac{x-5}{3-x} \geq 0$
- $\left| 2 - \frac{x}{3} \right| < 5$
- $4e^{2x} = 5$
- $2 \sin^2 x = \sin x + 1; 0 \leq x \leq 2\pi$

8. Factor the following expressions:

- $3x^3 + 192$
- $2x^3 - 11x^2 + 12x + 9$
- $9x^2 - 3x - 2$

9. Simplify:

- $2 \ln(x - 3) + \ln(x + 2) - 6 \ln x$
- $\frac{\frac{2}{x}-3}{1-\frac{1}{x-1}}$
- $x(1 - 2x)^{-\frac{3}{2}} + (1 - 2x)^{\frac{1}{2}}$
- $\frac{e^{-x}e^3 - e^3e^x}{e^{4x}}$

10. Simplify the expression  $\frac{x^2}{1+x^2}$  using long division.

11. Find the conjugate for the following radical expressions. Then use it to simplify the expression. (Yes we do sometimes conjugate the numerator in calculus)

- $\frac{x}{\sqrt{x}-\sqrt{x-1}}$
- $\frac{\sqrt{3+x}-\sqrt{3}}{x}$

12. Find the distance between  $(\frac{1}{2}, -7)$ ;  $(-3, 4)$

13. Find all the zeros of the following functions:

- a.  $y = \sin x$
- b.  $y = \sec x$
- c.  $y = \tan x$
- d.  $y = \cos 2x$

14. Find the following:

- a.  $\sin\left(\frac{7\pi}{6}\right)$
- b.  $\cos 120^\circ$
- c.  $\tan\frac{\pi}{2}$
- d.  $\csc 60^\circ$
- e.  $\sec\frac{-2\pi}{3}$
- f.  $\cot(-135)^\circ$

15. Simplify the following trigonometric expressions: (trig identities)

- a.  $4 \sin 2x \cos 2x$
- b.  $1 - \sec^2 x$
- c.  $\frac{1 + \cos 2x}{2}$
- d.  $\cos^2 x - \sin^2 x$
- e.  $\cos^2 x + \sin^2 x$

16. What do the following terms mean and give an example?

- a. Inverse of a Function
- b. Even Function
- c. Odd Function
- d. Continuous Function
- e. Maximum/Minimum Value of a Function
- f. Roots/Zeroes of a Function