



June 2020

### Summer Math Work: Calculus

We hope you are enjoying your summer, but are also thinking about how to have a great school year next year.

The attached problem set is intended to address Pre-Calculus topics needed for success. **All Calculus students are required to complete the problem set (part 1 and part 2) to be turned in to their teacher as a homework assignment when returning to school in the fall.** This is the “summer reading” for your mathematics course. Be sure to show your work clearly in completing the problems.

If you find that there are specific topics that you need to review in more depth, you may want to spend some time doing so. Please consider this in planning your time to work.

**You are welcome to receive help on any of the problems or topics covered.** Indeed, if you have difficulty, we encourage you to work with a parent, older sibling, friend, or teacher so that you master each topic. You may consult a textbook or online resource if you wish as you work through the problems. **Be sure, however, to show all your work, and that you understand all the work you present. Note that you will have a graded classroom test on this material shortly after the start of school in September.**

We do not expect this packet to be a burden for you. However, we know that reviewing these topics will put you in a much better position to succeed in Calculus.

Best wishes for a happy rest of the summer.

## PART 1:

### 1. Simplify

a.  $\frac{x-4}{x^2-3x-4}$

b.  $\frac{x^3-8}{x-2}$

c.  $\frac{5-x}{x^2-25}$

### 2. Trigonometric Pythagorean Identities

a)  $\sin^2 x + \cos^2 x = \underline{\hspace{2cm}}$

b)  $1 + \tan^2 x = \underline{\hspace{2cm}}$

c)  $\cot^2 x + 1 = \underline{\hspace{2cm}}$

### 3. Simplify each expression. Write answers with positive exponents where applicable:

a)  $\frac{1}{x+h} - \frac{1}{x}$       b)  $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$       c)  $\frac{12x^{-3}y^2}{18xy^{-1}}$       d)  $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$       e)  $(4a^{\frac{5}{3}})^{\frac{3}{2}}$

f)  $\log \frac{1}{100}$       g)  $\ln e^7$       h)  $27^{\frac{2}{3}}$       i)  $\log_{\frac{1}{2}} 8$       j)  $x^{\frac{3}{2}}(x + x^{\frac{5}{2}} - x^2)$

### 4. Using either the slope/intercept or point slope form of a line, write an equation for the lines described:

- Containing the points (1,-3) and (-5,2)
- With slope 0, containing the point (4,2)
- Parallel to  $2x-3y=7$  and passes through (5,1)
- Perpendicular to the line in part d, containing the point (3,4)

5. Without a calculator, determine the EXACT value of the expression:

a)  $\sin \frac{\pi}{2}$

b)  $\sin \frac{3\pi}{4}$

c)  $\cos \pi$

d)  $\cos \frac{7\pi}{6}$

e)  $\cos \frac{\pi}{3}$

f)  $\tan \frac{7\pi}{4}$

g)  $\tan \frac{2\pi}{3}$

h)  $\tan \frac{\pi}{2}$

## PART 2

**SHORT ANSWER. Show all work box all answers**

**For the pair of functions, find the indicated sum, difference, product, or quotient.**

1)  $f(x) = 7x - 8$ ,  $g(x) = 3x - 7$

Find  $(f - g)(x)$ .

1) \_\_\_\_\_

2)  $f(x) = 4 - 4x$ ,  $g(x) = -9x^2 + 4$

Find  $(f + g)(x)$ .

2) \_\_\_\_\_

3)  $f(x) = x^2 + 1$ ,  $g(x) = 6x - 4$

Find  $(fg)(x)$ .

3) \_\_\_\_\_

4)  $f(x) = \sqrt{4x + 4}$ ,  $g(x) = \sqrt{4x - 16}$

Find  $(fg)(x)$ .

4) \_\_\_\_\_

**Factor the polynomial completely.**

5)  $x^2 + 6x - 27$

5) \_\_\_\_\_

6)  $x^2 + 23x + 24$

6) \_\_\_\_\_

7)  $10x^2 + 21x + 9$

7) \_\_\_\_\_

8)  $5x^2 + 7x - 6$

8) \_\_\_\_\_

9)  $14x^2 + 63x - 35$

9) \_\_\_\_\_

10)  $x^2 - 121$

10) \_\_\_\_\_

11)  $2x^2 - 50$

11) \_\_\_\_\_

**Solve the equation.**

12)  $3x(x + 8) = (2x - 1)(x + 8)$

12) \_\_\_\_\_

**Simplify the expression. All exponents should be positive integers.**

13)  $-4x^{-5}y(7x^5y)z^4$

13) \_\_\_\_\_

14)  $\left( \frac{6x^{-3}z^3}{2xz^{-3}} \right)^{-3}$

14) \_\_\_\_\_

**Solve the equation for the specified variable.**

15)  $P = \frac{A}{1 + rt}$  for  $r$

15) \_\_\_\_\_

16)  $P = \frac{Fd}{t}$  for  $t$

16) \_\_\_\_\_

**Solve the equation.**

17)  $\frac{19}{x} = 4 - \frac{1}{x}$

17) \_\_\_\_\_

18)  $\frac{7}{x+3} - \frac{5}{x-3} = \frac{8}{x^2 - 9}$

18) \_\_\_\_\_