

## Summer Work – Honors Calculus

Students who have just completed Pre-Calculus should be familiar enough with the following material and vocabulary to be held accountable on the first day of school.

Please show work on a separate sheet of paper.

Feel free to use online resources and previous notes, etc., to help you. (If you're feeling really stuck, you can email me at [landerson@bcsk12.org](mailto:landerson@bcsk12.org))

### I: VOCABULARY

For each word below: a) Define it in your own words  
b) Either indicate what it is, what it's used for, or show an example that demonstrates its use, as appropriate.

Conjugate	Polynomial
Integer	Domain
Opposite	Domain Restrictions
Reciprocal	Range
Real/Rational/Irrational Numbers	Slope-Intercept Form
Local maximum/minimum	Point-Slope Form
Unit Circle	Area formulae (circles, rectangles, triangles, trapezoids)

### II: SIMPLIFY

Simplify each of the following expressions:

a)  $\frac{x^2 - 2x + 1}{x^3 + x} \cdot \frac{4x^2 + 4}{x^2 + x - 2}$

b)  $\frac{x - 3}{x + 4} + \frac{x}{x - 2}$

c)  $\frac{x}{x - 3} - \frac{x + 1}{x^2 + 5x - 24}$

d)  $\frac{\frac{x^2}{x^2 - 4} - 3}{\frac{x - 3}{x + 2} - 1}$

### III : FACTOR Completely

(Some useful techniques: grouping, sum/difference of squares/cubes, GCF)

a)  $9y^2 + 9y - 4$

b)  $y^4 + 17y^3 + 30y^2$

c)  $6x^2 + 8x + 2$

d)  $3 - 27x^2$

e)  $x^6 - 2x^3 + 1$

f)  $8 + 125y^3$

g)  $x^3 - 4x^2 + 2x - 8$

h)  $x^4 - 1$

i) Use Synthetic Division to factor  $2x^3 + 11x^2 - 7x - 6$  completely.

### IV: SOLVE

a)  $x = 2(x - 1)^{-2}$

b)  $3x^2 - 5x + 1 = 0$

c)  $4x^3 = x - 2x^2$

d)  $(x^2 - 16)^{\frac{1}{2}} = 9$

e)  $\frac{x+1}{3} + \frac{x+2}{7} = 5$

F) Use the graphing calculator to find the solutions to  $-x^3 - \frac{5}{3}x^2 + \frac{7}{2}x + 2 = 0$

### V: TRIGONOMETRY (Best if done without a calculator...)

a) List the 6 reciprocal Identities

b) List the 3 Pythagorean Identities

c) Give radian equivalents for all multiples of 30, 45 and 60 degrees on the Unit Circle

d) Write the appropriate ordered pair for each angle (in c above) on the Unit Circle.

e) Graph  $y = 3\sin x + 1$

f) Graph  $y = -\cos 4x$

g) Solve  $\cos \theta = \frac{1}{2}$  for  $0 \leq \theta \leq 2\pi$

h) Solve  $2\sin \theta + \sqrt{3} = 0$  for  $0 \leq \theta \leq 2\pi$

i) Verify  $\sin \theta (\cot \theta + \tan \theta) = \sec \theta$

## VI: LOGARITHMS AND EXPONENTS

Simplify the following.

$$x^5 \cdot x^9$$

$$(6x^2)(4x^2)$$

$$(2^3 x)^2 :$$

$$\left(\frac{x^{-8}}{y^{11}}\right)^{-2}$$

$$\frac{2 \cdot x^3 y^8}{4 \cdot y^2}$$

$$\frac{a^{12} b^{-3}}{a^5 b^5}$$

Write in log form or exponential form (switch from one to the other).

$$\log_3 81 = 4$$

$$4^{-2} = \frac{1}{16}$$

## VII: MISCELLANEOUS

a) Write the equation of the line given the points (8, -6) and (-5, -1). Write the equation in point-slope form.

b) Find  $f(g(x))$  given  $f(x) = 1 - x^2$  and  $g(x) = 4x + 2$ . Then simplify.

c) What are the asymptotes of the function:  $(2x) / (x^2 - 4)$ ? What are the x and y intercepts?