Summer Homework for Students entering Honors Pre-Calculus

This will be your first grade in Honors Pre-Calculus. Some of these problems are more challenging than others. Do your best. We will review these problems on day 1, followed by a short quiz.

1. Write the equation of the line through the points $\left(\frac{-14}{3}, 2.1\right), \left(4.4, \frac{7}{6}\right)$.

2. Write the equation of the line through the points $(x_1, y_1), (x_2, y_2)$.

3. Write the equation of 3 lines that are perpendicular to the line $2x - 3y + 7 = 0$.

4. Explain how "a", "b", "c", and "d" affect the graph of $f(x) = a\sqrt[3]{bx + c} + d$.

Start by examining functions that include only one of the following a,b,c,d to ` $f(x) = \sqrt[3]{x}$.

$$f(x) = 3\sqrt[3]{x}$$
$$f(x) = \frac{1}{2}\sqrt[3]{x}$$
$$f(x) = 6\sqrt[3]{x}$$
$$f(x) = -9\sqrt[3]{x}$$
$$f(x) = -\frac{1}{2}\sqrt[3]{x}$$

Ex. Compare how "a" effects the graph- .

Generalize and continue to find the effects of b,c,d.

5. $If: f(x) = x^2 - 5x + 7, g(x) = x^3 - 4$

$h(x) = (f + g)$ Find h(2)

$c(x) = (g - f)$ Find c(1/2)

$z(x) = (f \circ g)$ Find z(4)

5b. $f(x) = 5x - 4$ and $g(x) = 3 - 2x$. Find $f(f(f(f(f(f(g(1))))))$.

5.9 Does every function have an inverse?

6. Find the domain and range of the following function and its inverse. Determine if the inverse is a function or not.

f(x)= $2x^2 - 1$

7. Graph the following equation and determine the zeros algebraically (using the quadratic equation or a factoring method).

f(x)= $x^3 + 2x^2 - 18x$

8. Use synthetic division to find the zeros of the following equation.

f(x)= $2x^3 + 3x^2 - 8x + 3$

9. Multiply the following and plot the resultant on a complex coordinate plane.

$f(x) = \left(3 + \sqrt{-5}\right) \bullet \left(7 - \sqrt{-10}\right)$

10.Find the zeros of the following function (include all zeros, ie. Find the complex as well)

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

11. Graph the following by hand and then using a graphing utility to check your answer.

$f(x) = -3^{x+4} - 5$

$f(x) = 4 + \log_{10}(x - 5)$

12. Evaluate the following.

$\log_2 8$

$\log_6 1294$

$\log_x x^5$

Are there any restrictions on x?

13. Solving the following with or without a calculator

$\log_6 10$

$\log_7 129$

$\log_{67} 290$

13b. Suppose there exists some base, b, such that

$\log_b 2 = 1.89$

$\log_b 5 = 2.07$

$\log_b 3 = 1.91$

Find $\log_b \frac{25}{6}$

14. Sketch the graph of the following (use at least five points). Also include the x-intercepts, the y-intercepts, vertical asymptotes, horizontal asymptotes.

a) $f(x) = \frac{x^2 - 9}{x^2 - 2x - 3}$

b) $f(x) = \frac{x^2 - x - 2}{x - 1}$

15. Simplify the following equations.

$$g(x) = \ln\left(\frac{x^2 - 12x + 36}{x - 5}\right)$$

$$h(x) = \log_b\left(\frac{x^2}{y^2 z^3}\right)$$

$$f(x) = 5\log_2(x) + 6\log_2(x) - .5\log_2(x^2)$$

16. Solve the following equations and check for extraneous solutions.

$$\ln(x-2) + \ln(2x-3) = 2\ln x$$

$$4^{5x-2} + 100 = 116$$

$$2\log_x 5 + 3\log_x 3 + 10 = 12$$

17. Convert the following from radian to degrees and degrees to radian. Then find a complement (if possible) and a supplement and decide in which quadrant the terminal is.

$$\frac{8\pi}{9}, 36180^\circ, 10$$

18. Find the rectangular coordinates of a point on the unit circle of the following angles. Also find the 6 trig functions of this angle.

$$\frac{5\pi}{6}$$

$240°$

19. Verify the following identities

$$(\csc\Theta + \cot\Theta) \bullet (\csc\Theta - \cot\Theta) = 1$$

$$\frac{\tan\Theta + \cot\Theta}{\tan\Theta} = \csc^2\Theta$$

20. Graph the following functions (plot at least the maximums, minimums and zeros of the function)

$$y = 3\cos\left(\frac{\pi x}{2} + \frac{\pi}{6}\right) + 5$$

$$y = -3\tan(4x) - 3$$

$$y = \csc(2x - \pi)$$

22. Find all six trig functions of the following angle given the conditions stated below.

a.

$$\tan\Theta = \frac{3}{4} \,\&\, \sin\Theta < 0$$

b.

$$\sin\Theta = -\frac{6}{10} \,\&\, \cot\Theta < 0$$

21. Consider the following table of values:

				1				
			3		5			
		7		9		11		
	13		15		17		19	
21		23		25		27		29

a) What is the sum of the 10^{th} row of this pattern?

b) The sum of a certain row's entries is 24389. What row is it and what are the entries?

c) Guess the general law suggested by these examples, express it in suitable mathematical notation. Can you prove it?