Math-19 Sections 1

Final Exam

Name: _____

This exam is closed book and notes. You may use a TI-84 graphing calculator; however, no other electronics are allowed. You may also use the trig cheatsheet distributed in class with your own notes added to the back. Show all work; there is no credit for guessed answers. Simplify your answers unless told otherwise. In particular, all answers should contain no negative or rational exponents. All numerical answers should be in exact form unless you are specifically asked for a decimal value.

problem	score
1	
2	
3	
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10	
TOTAL	

1. Calculate the difference quotient for $f(x) = x^2 - 3x + 1$

2. Consider the function:

$$h(x) = (x + 2)^3 + \sqrt{x + 2} - 2e^{x+2} + \ln(x + 2)$$

Determine two functions $f(x)$ and $g(x)$ such that $h = f \circ g$ and neither $f(x) = x$ nor $g(x) = x$.

3. A sample of bismuth-210 decays to 33% of its original mass after 8 days. Find the half-life of this isotope.

4. Fully expand the following logarithmic expression:

$$\ln\left[\frac{x^3(x+1)e^x}{\sqrt[3]{x-2}(x-1)^2}\right]$$

5. Consider the ellipse with foci at $(-2, 1)$ and $(6, 1)$ and an eccentricity of $\frac{1}{2}$.

    (a) Determine the standard-form equation of the ellipse.

    (b) Sketch the ellipse. You must show and label the center, the foci, and all four vertices.
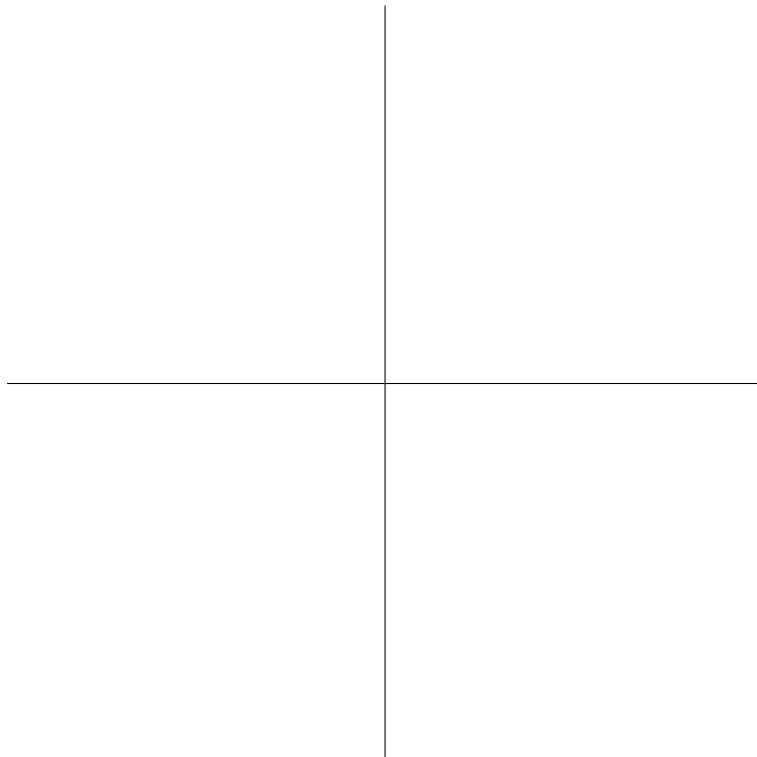
6. Sketch the graph for one full period of the following sinusoidal function. You must show how you calculate the period and the five key points on the graph. Be sure to show the amplitude and label the t values for the five key points.

$$y = -2\sin\left(\frac{\pi}{2}t - \frac{\pi}{6}\right)$$

7. You are standing about one quarter mile away from a hill. By tilting your head upward at an angle of $30°$, you are looking straight at a hiker on the summit. Assuming that your eye level is about 5 ft from the ground, about how high is the hill (in feet, 1 mi=5280 ft).

8. Rewrite the following expression in terms of x and y:

$$\cos(\sin^{-1} x + \cot^{-1} y)$$

9. Rewrite the following expression as a single sin expression:

$$\sin(\pi x) + \sqrt{3}\cos(\pi x)$$

10. Find all solutions to the following equation and state the answer in the most efficient possible form:

$$\tan^2 2x - 1 = 0$$