Math 1550 Final Exam – Spring 2012

Show all of your work in your blue book in order to receive credit. Write clearly, use proper notation, and write out the formulas you use. Only the work done in the blue book will be graded. You are only allowed to have a scientific calculator (NOT a graphing calculator). No cell phones are allowed and no sharing of calculators is allowed. Be sure and rationalize all denominators.

1) Find the center and radius for the following circle: $2x^2+2y^2+6x-8y+12=0$

2) Solve the following exactly (no calculator approximations): $x^2+7x-1=0$

3) Solve the following inequality. Write your answer in interval notation. $x^2+3x-40>0$

4) Consider the function $f(x)=\frac{2}{x}-5$ for the following:

(a) Find $f^{-1}(x)$

(b) Use the composition of $f(x)$ and $f^{-1}(x)$ to algebraically verify your solution found in part (a)

5) Suppose that a new community college has 1200 students 5 years after it opens, and 1920 students 8 years after it opens.

(a) Assuming linear growth, write an equation, $E(t)$, that relates the enrollment to the number of years the college has been open, t.

(b) Use your equation found in part (a) to predict the enrollment after 12 years.

6) Determine the following for the function: $f(x)=\frac{x^2-2x+1}{x^2-2x-8}$

(a) Domain
(b) Range
(c) X-Intercept(s) (if any)
(d) Y-Intercept(s) (if any)
(e) Vertical Asymptote(s)
(f) Horizontal Asymptote(s)
(g) Sketch a graph of the function

7) Growth of bacteria in food products causes a need to "time- date" some products so that shopper will buy and consume the product before the number of bacteria grows too large and becomes harmful. Suppose that the formula $f(t)=500e^{0.1t}$ represents the growth of bacteria in a food product where t represents the time in days and $f(t)$ represents the number of bacteria. If the product cannot be eaten after the bacteria count reaches 4,000,000, how long will it take?

8) Solve the following for x: $\log_3(x)+\log_3(2x-3)=2$

9) Give the exact values (not calculator approximations) of the following expressions: (If the answer is an angle, use radians. Not all answers are angles)

(a) $\tan(120°)$

(b) $\sin\left(-\frac{4\pi}{3}\right)$

(c) $\sec\left(\frac{\pi}{6}\right)$

(d) $\cos^{-1}\left(-\sqrt{2}/2\right)$

(e) $\tan\left[\sin^{-1}(3/5)\right]$

10) Given that $\cos\theta = -\frac{1}{3}$ and $\pi \le \theta \le \frac{3\pi}{2}$ determine the exact values (not calculator approximations) for the other five trigonometric functions.

11) Graph at least one period of $y = 3\sin\left(\pi x - \frac{\pi}{2}\right)$. Clearly state the amplitude, period, phase shift and intercepts.

12) Prove the following identity: $\tan x + \cot x = \csc x \sec x$

13) Use a sum or difference identity to find the exact value (no calculator approximations) of $\cos\left(\frac{5\pi}{12}\right)$

14) Determine all solutions of the following equation on the interval $[0, 2\pi)$: $2\sin^2 x + \sin x - 1 = 0$

15) A straight trail with a uniform inclination of $20°$ leads from a lodge at an elevation of 1000 feet to a mountain lake at an elevation of 5300 feet. What is the length of the trail (to the nearest foot)?

16) Suppose a triangle has sides a=6ft, b=9ft, c=12ft. Determine the three angles of the triangle in degrees to one decimal place.

17) Solve the following system of equations:

$$\begin{cases} x + y = -4 \\ y - z = 1 \\ 2x + y + 3z = -21 \end{cases}$$

18) Sketch the graph of $36x^2 + 9y^2 = 324$. Clearly state the name of the figure, the center, the foci, and the x and y intercepts.

19) Find all the roots and state the multiplicity of each for the following: $x^3 + 5x^2 + 3x - 9 = 0$

20) Find the partial fraction decomposition for the following: $\frac{4x-12}{(x+4)(x-2)}$