

**THIRD EXAM, MATH 30: PRE-CALCULUS. FALL 2013**

Do all questions and show all the work. The total number of points in the test is 109.  
Due 11/25/2013

- Given the polynomial  $f(x) = 2x^3 - 5x^2 - 11x - 4$ :
  - (3 points) Find the list of all possible zeroes.
  - (3 points) Is  $x = -1/2$  a zero of  $f(x)$ ? Why?
  - (6 points) Find all the zeroes of  $f(x)$ .
  - (3 points) Factor  $f(x)$  completely.
  - (5 points) Sketch the graph of  $f(x)$ .
- Given the rational function  $f(x) = \frac{x^2 - 3x - 4}{2x^2 - 8}$ :
  - (3 points) Find the  $y$ -intercept.
  - (3 points) Find the  $x$ -intercepts.
  - (3 points) Find the domain of  $f(x)$ .
  - (3 points) Find the equation of the vertical and horizontal asymptotes.
  - (8 points) Solve Inequality  $f(x) \leq 0$ .
  - (3 points) Sketch the graph  $y = f(x)$ .
- Given  $f(x) = 4^{x-2} - 3$ :
  - (3 points) Filled up a table of values with  $x = 0, 1, 2, 3, 4$ .
  - (5 points) Find the equation of the inverse  $f^{-1}$  and a table of values to graph it.
  - (5 points) Sketch both functions  $f(x)$  and  $f^{-1}(x)$  in the same set of coordinate axis. What symmetry do you observe?
  - (3 points) State intercepts and asymptotes for  $f$  and  $f^{-1}$ .
- (8 points) Compute the  $x$  in each case:  
a)  $\log_2(x) = 5$ ,      b)  $\log_x(3) = 2$       c)  $\log_8(4) = x$       d)  $\log_{27}(1/9) = x$
- (4 points) Given  $\log_b(x) = 3$  and  $\log_b(y) = -9$ , find  $\log_b(xy)$  and  $\log_b(x/y)$ .
- (3 points) Find domain of the function  $f(x) = \log_2(x - 4) + \log_2(x + 3)$ .
  - (5 points) Solve the equation  $\log_2(x - 4) + \log_2(x + 3) = 3$  on its domain.
- (5 points) Solve the equation  $3(5^{x-3} + 2) = 10$ . Round your answer to the nearest thousandth.
- (8 points) Find the value of:  
a)  $\sin(11\pi/4)$       b)  $\cos(4\pi/3)$       c)  $\tan(11\pi/6)$       d)  $\sin(5\pi/3)$
- Solve the equations in the interval  $[0, 2\pi)$ .
  - (2 points)  $2\sin(x) + \sqrt{3} = 0$ .
  - (4 points)  $(2\cos(x) - 1)(\cos(x) - 2) = 0$ .
- Given the function  $f(x) = 3\sin(2x - \pi)$ .
  - (3 points) Identify Amplitude, Period and Phase Shift.
  - (5 points) Sketch One cycle of  $y = f(x)$ .
  - (3 points) Identify in the graph, the maxima, the minima and the zeroes.