EXAM 3 - MATH 111 Friday, April 1

YOUR NAME:_____ George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

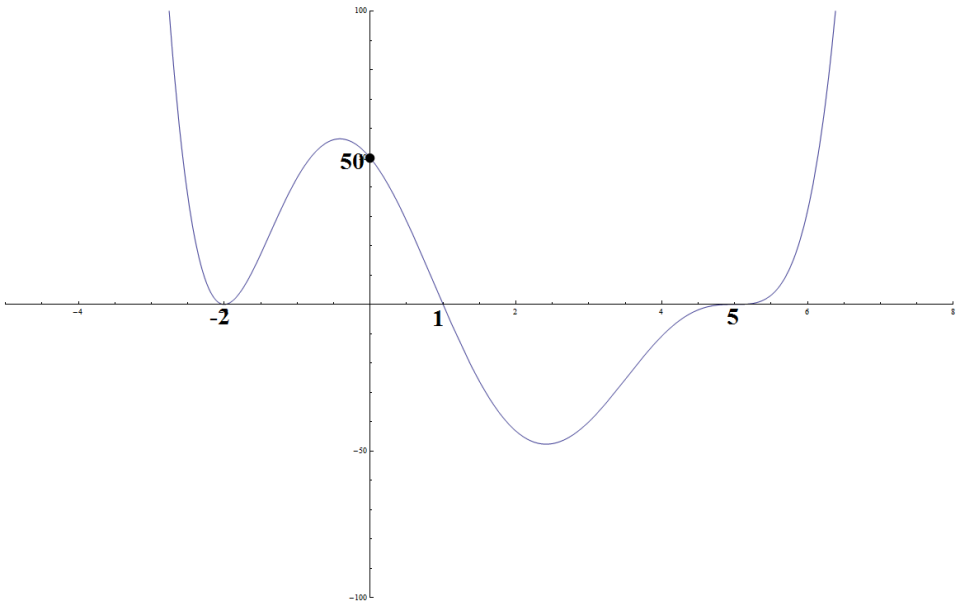
1. Consider the polynomial $f(x) = x^3 - 3x + 2$.

   (a) Note that $f(1) = 0$. Use the Factor Theorem to find all factors of $f(x)$.

   (b) Based on Part (a) give all zeros of $f(x)$ and their multiplicities.

   (c) Based on Part (b), sketch the graph of $y = f(x)$. (Please, be neat and label all important points.)

2. The following figure show the graph of a polynomial function $y = f(x)$.

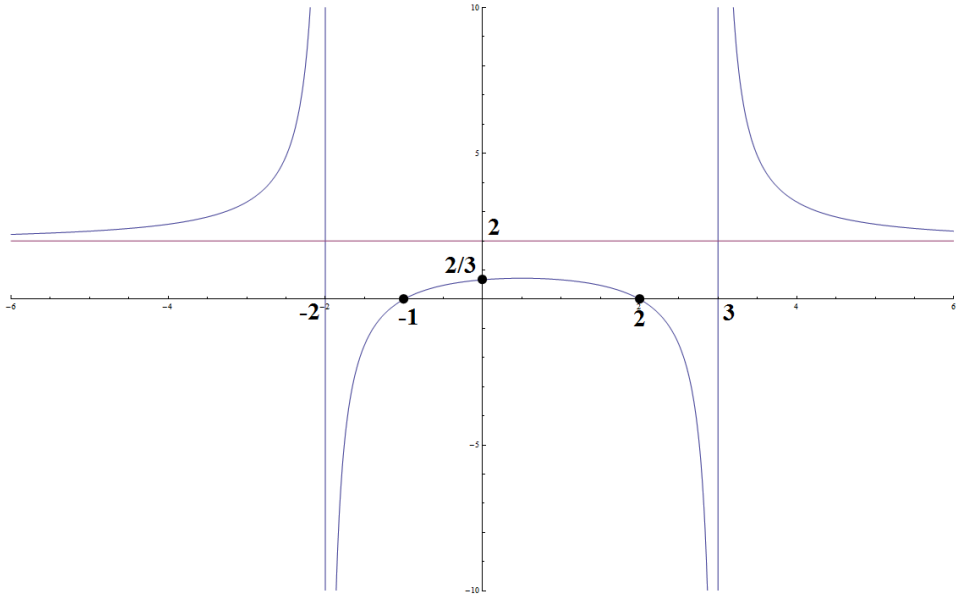


(a) Describe **formally** the end behavior of $y = f(x)$.

(b) Give the zeros and their multiplicities.

(c) Find a formula for $y = f(x)$.

3. The following figure shows the graph of a rational function $y = f(x)$.



(a) Find the vertical and horizontal asymptotes (these are lines).

(b) Find the x- and y-intercepts (these are points).

(c) Find a possible formula for $y = f(x)$.

4. Consider the function $f(x) = 2(x-3)^2 - 1$.

   (a) Sketch its graph neatly, labeling all important points.

   (b) Restrict its domain so as to be able to consider an inverse function.

   (c) Find a formula for the inverse of $f(x)$, assuming its domain is the one you gave in Part (b).

5. Suppose a quantity x varies

   - directly with both y and the cube root of z;
   - inversely with the square of w.

   (a) Write an equation expressing the relation of joint variation described above (with undetermined constant).

   (b) Suppose that, when $y = 2$, $z = 27$, $w = 2$, we have $x = 9$. Determine the constant you used in Part (a).

   (c) Find the value of z, if $x = 24$, $y = 12$ and $w = 3$.