EXAM 3 - MATH 111Friday, March 28YOUR 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 function y = f(x) shown below.



- (a) Describe its end behavior **formally**.
- (b) Find the *y*-intercept.
- (c) Find the *x*-intercept(s) and their multiplicities.
- (d) Give a possible formula for y = f(x), showing all steps.

2. (a) Perform the long division and write your answer in an appropriate form

$$(x^5 - 3x^2 + 5) \div (x^2 - 3).$$

(b) Use synthetic division for

$$(3x^4 - 5x^2 + 16x + 2) \div (x+2)$$

and write the answer in an appropriate form.

3. Consider the rational funcion

$$f(x) = \frac{x(x-2)^2}{(x+1)^2(x+5)}.$$

- (a) Find the domain showing some steps.
- (b) Find the vertical asymptotes.
- (c) Find the horizontal asymptote giving some explanations.
- (d) Find the *y*-intercept showing all steps.
- (e) Find the *x*-intercepts showing all steps.

4. Consider the rational function y = f(x) whose graph is shown below.



- (a) Find its domain.
- (b) Find its vertical asymptotes.
- (c) Find its horizontal asymptote.
- (d) Find its *x*-intercepts.
- (e) Find a possible formula for y = f(x) showing all details.

- 5. A quantity w varies directly with the square of x and the cube root of y and inversely with the square root of z.
 - (a) If it is known that, when x = 5, y = 8 and z = 16, then w = 5, find a relation of joint variation between these variables.

(b) Suppose that x = 100, y = 8 and w = 4. Find the corresponding value of z.