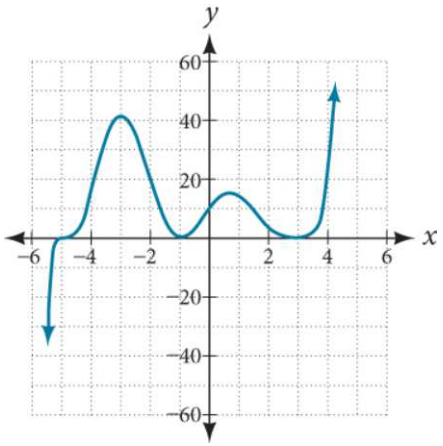
EXAM 3 - MATH 111 Friday, March 31

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



   (a) Give using formal notation the end behavior of $y = f(x)$. From the end behavior identify the sign of the leading coefficient and the parity of the degree of $y = f(x)$

   (b) Give the y-intercept. Give, also the x-intercepts with multiplicities using a small table. (All these must be given carefully as points.)

   (c) Find a formula for the function $f(x)$ whose graph is shown.

2. (a) Perform the long division $(x^5+x^3-7)\div(x^2-2)$ and write your answer in the appropriate form.

(b) Suppose you are given that $x=-1$ is a zero of the polynomial

$$f(x)=2x^3+19x^2-13x-30.$$

Use the Factor Theorem to find the remaining zeros of $f(x)$.

3. Consider the function $f(x) = \dfrac{x^2 + x - 6}{x^2 - 3x}$. Find all following features by hand.

(a) Find the domain $\text{Dom}(f)$.

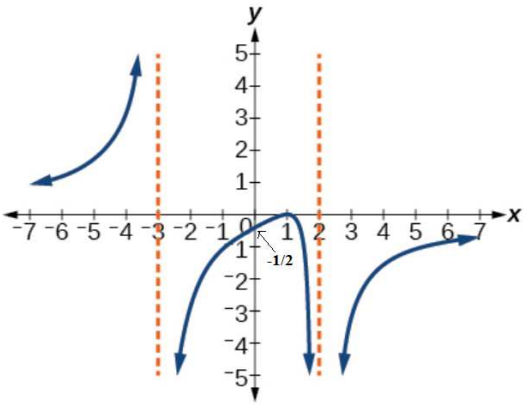
(b) Find the vertical asymptote(s) (explain).

(c) Find the horizontal asymptote (explain).

(c) Find the y-intercept showing all work and steps.

(d) Find the x-intercepts showing all work and steps.

4. Consider the function $f(x)$ whose graph is shown below. Find all following features by hand.



(a) Find the domain Dom(f).

(b) Find the vertical asymptote(s).

(c) Find the horizontal asymptote.

(c) Find the y-intercept.

(d) Find the x-intercept.

(e) Find a possible formula $y = f(x)$ for the graph shown. Explain how you are putting the various pieces together.

5. (a) A quantity y varies directly with a quantity z and with the square root of a quantity x. If $y = 8$, when $x = 16$ and $z = 2$, find a relation of join variation between these quantities.

(b) A quantity y varies directly with the cube of x and inversely with the square of z. Suppose $y = 4$, when $x = 3$ and $z = 6$.

(a) Find a relation of joint variation relating these quantities.

(ii) Find the value of x, when $z = 3$ and $y = \frac{8}{3}$.