

COLLEGE ALGEBRA - MAT 140

FALL 2008 - Review 3

Name :.....

I. State whether each statement is **True** or **False** as stated. Provide a clear reason for your answer.

- If the discriminant $b^2 - 4ac = 0$, the graph of $f(x) = ax^2 + bx + c$, $a \neq 0$, will touch the x -axis at its vertex.
- The graph of $f(x) = x^2(x - 3)(x + 4)$ has exactly three x -intercepts.
- End behavior: the graph of the function $f(x) = 3x^4 - 6x^2 + 2x + 5$ resembles $y = x^4$ for large values of $|x|$.
- The graph of a function may intersect a vertical asymptote.
- The graph of a function will never intersect an oblique vertical.

II. Determine the quadratic function whose graph is given in Figure 1.

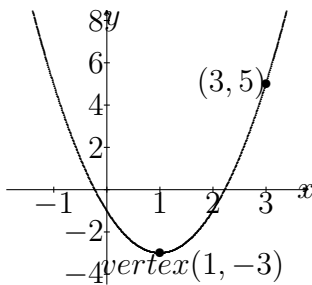


Figure 1:

III. Suppose that the manufacture of a gas clothes dryer has found that, when the unit price is p dollars, the revenue R (dollars) is $R(p) = -4p^2 + 4000p$.

- What unit price for the dryer should be established to maximize revenue?

- What is the maximum revenue?

IV. A farmer with 4000 meters of fencing want to enclose a rectangular plot that borders on a river. If the farmer does not fence the side along the river, what is the largest area that can be enclosed?

V. Determine which functions are polynomial functions. For those that are, state the degree.

(i) $h(x) = 3 - \frac{1}{2}x$ (ii) $F(x) = \frac{x^2 - 5}{x^3}$ (iii) $G(x) = 2(x - 1)^2(x^2 + 1)$

VI. Form a polynomial whose zeros and degree are given.

Zeros : -1 , *multiplicity* 1; 3 , *multiplicity* 2; *degree* 3

VII. For the polynomial: $f(x) = -x^2(x^2 - 1)(x + 1)$

- Find the degree of the polynomial. Determine the end behavior; that is, find the power function that the graph of f resembles for large values of $|x|$.
- Find the x - and y -intercepts of the graph of f .
- Determine whether the graph crosses or touches the x -axis at each x -intercept.
- Use a graphing utility to determine the number of turning points on the graph of f . Approximate the turning points, if any exist, round to two decimal places.
- Use the information obtained in parts (a) to (d) to draw a complete graph of f by hand.
- Find the domain of f . Use the graph to find the range of f .

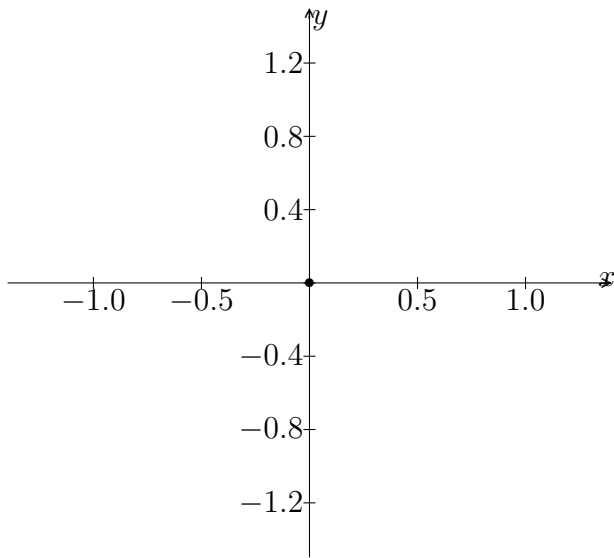


Figure 2:

h) Use the graph to determine where f is increasing and where f is decreasing.

VIII. Find the domain of each rational function

- $R(x) = \frac{x}{x^3 - 8}$

- $R(x) = \frac{3(x^2 - x - 6)}{4(x^2 - 9)}$

IX. Find the vertical, horizontal and oblique asymptotes, if any, of the rational function

$$G(x) = \frac{x^3 - 1}{x - x^2}.$$