

Math 141 Exam 2 (Sample)

Name:

1. Let $f(x) = x^2 + 6x + 5$. Answer the following:

- (a) Find the vertex and the axis of symmetry.
- (b) Sketch the graph.

2. The price p (in dollars) and the quantity x sold of a certain product obey the demand equation $p = -x + 300$. What quantity x maximizes revenue? What is the maximum revenue?

3. Find the x -intercepts of $y = f(x) = x^2 - x - 6$, if any. Does the graph open up or down? Using the graph of f , solve the inequality $x^2 - x - 6 \leq 0$.

4. Find the x -intercepts of $y = g(x) = -x^2 + 2x - 4$, if any. Does the graph open up or down? Using the graph of f , solve the inequality $-x^2 + 2x - 4 < 0$.

5. (a) Find the quotient and the remainder when $2x^3 + 4x^2 - 5x - 2$ is divided by $x^2 + x - 2$.

(b) Find the vertical, horizontal, and oblique asymptotes, if any, of

$$R(x) = \frac{2x^3 + 4x^2 - 5x - 2}{x^2 + x - 2}$$

6. Graph each function using transformations

(a) $f(x) = (x - 1)^3$ (b) $g(x) = (x + 2)^4 - 1$

(c) $h(x) = \frac{1}{(x + 1)^3} + 1$ (d) $k(x) = \frac{1}{(x - 2)^4} - 1$

7. For $f(x) = (x+1)^2(x-1)^3(x-2)$, do the following.
- (a) List each real zero and its multiplicity.
 - (b) Determine whether the graph crosses or touches the x -axis at each x -intercept.
 - (c) Determine the maximum number of turning points on the graph.
 - (d) Determine the end behavior; that is, find the power function that the graph of f resembles for large values of $|x|$.
 - (e) Sketch the graph of f .

8. Let $R(x) = \frac{x^2 + x}{x^2 + x - 2}$. Answer the following.

- (a) Find the domain.
- (b) Write $R(x)$ in lowest terms.
- (c) Find the intercept(s) of the graph.
- (d) Find the vertical asymptote(s).
- (e) Find the horizontal or oblique asymptote, if one exist.
- (f) Sketch the graph.