

READ AND FOLLOW ALL DIRECTIONS. CIRCLE YOUR FINAL ANSWERS.
SHOW ALL WORK TO RECEIVE FULL CREDIT. NO CALCULATORS.

1. (16 points) Let $f(x) = -3x^2 + 12x - 9$

(a) Circle the correct option:

The graph of f (opens up / opens down) and has a (highest / lowest) point.

(b) Find the vertex of the graph of $f(x)$.

(c) Find the x-intercept(s) of $f(x)$.

(d) Find the y-intercept of $f(x)$

Test #2

2. (10 points) Identify the domain of each of the following functions.

(a) $f(x) = x^{15} + 25x^5 + x^3$

(b) $R(x) = \frac{x^2-4}{x^2-x-2}$

(c) $s(x) = \frac{1}{\sqrt{x-4}}$

3. (16 points) The price p (in dollars) and the quantity x sold of a certain product obey the demand equation $p = \frac{-1}{10}x + 150$.

(a) Express the revenue R as a function of x .

(b) What is the revenue (in dollars) if 10 units are sold?

(c) What quantity x maximizes the revenue?

Test #2

4. (8 points) Determine whether each of the following functions is a polynomial. For those which are polynomials, state the degree.

(a) $f(x) = x^5 + 6x + 6$

(b) $g(x) = x^{\frac{3}{2}} + 4x + 2$

(c) $h(x) = 15$

5. (20 points) Let $f(x) = x^3 - 3x^2 - 6x + 8$

(a) Determine how many positive and negative real zeros $f(x)$ may have.

(b) List the possible rational roots of $f(x)$.

(c) Factor $f(x)$ completely over the real numbers.

Test #2

6. (20 points) Let $f(x) = (x - 2)(x^2 + 4x + 4)$

(a) List the real zeros of $f(x)$ and their multiplicities.

(b) Identify the y-intercept of the graph of f .

(c) Determine whether the graph crosses or touches the x-axis at each x-intercept.
(e.g. "The graph of $f(x)$ (crosses/touches) the x-axis at $x=c$.")

(d) What power function $g(x)$ does the graph of f resemble for large values of $|x|$?

7. (10 points) Let $G(x) = \frac{x-4}{x^2-4}$

(a) Circle the correct option:

$G(x)$ (is / is not) in lowest terms.

$G(x)$ is a (proper / improper) rational function.

Test #2

- (b) List the vertical asymptote(s) of $G(x)$.
- (c) List the horizontal asymptote(s) of $G(x)$.
8. (5 points) EXTRA CREDIT. Write a quadratic function $f(x)$ which has vertex $(2, 4)$ and y-intercept $(0, 2)$.