

MULTIPLE CHOICE SECTION.

Choose the best alternative.

(2 pts each)

1. Solve: $2m^2 - m + 9 = 0$.

a) $\frac{1 \pm \sqrt{73}}{4}$

c) $\frac{1}{4} \pm \frac{\sqrt{71}}{4}i$

b) $\frac{1}{4} \pm \frac{\sqrt{35}}{4}i$

d) $\frac{1 \pm \sqrt{71}}{4}$

2. Solve: $|5x - 6| = 20$.

a) $-\frac{14}{5}, \frac{26}{5}$

c) $-70, 130$

b) $-\frac{26}{5}, \frac{26}{5}$

d) $\frac{26}{5}$

3. Solve: $|4 - 3x| \leq 2$.

a) $[2, 2/3]$

c) $[2/3, 2]$

b) $(-\infty, 2/3] \cup [2, \infty)$

d) $(-\infty, 2] \cup [2/3, \infty)$

4. Solve: $|2 - 5x| \geq 3$.

a) $[-1/5, 1]$

c) $(-\infty, -1] \cup [1/5, \infty)$

b) $(-\infty, -1/5] \cup [1, \infty)$

d) $[1, -1/5]$

5. Solve: $x^2 - 3x - 10 > 0$.

a) $(-\infty, -5) \cup (2, \infty)$

c) $(-2, 5)$

b) $(-5, 2)$

d) $(-\infty, -2) \cup (5, \infty)$

6. Solve: $\frac{x-5}{x+2} \leq 0$.
- a) $(-\infty, -5] \cup (2, \infty)$ c) $(-2, 5]$
 b) $(-2, 5)$ d) $(-\infty, -5) \cup (-2, \infty)$
7. For the graph of the function $f(x) = 2x^2 - 12x + 14$, find the vertex.
- a) $(3, 4)$ c) $(-4, 3)$
 b) $(6, 14)$ d) $(3, -4)$
8. The Shanghai World Financial Center is about 1614 feet tall. How long would it take an object falling freely from the top to reach the ground? Use $s = 16t^2$.
- a) About 10.0 sec c) About 2.5 sec
 b) About 50.4 sec d) About 100.9 sec
9. Solve $\sqrt{19-3x} = x-3$.
- a) No solution c) 5
 b) $11/2$ d) $-2, 5$
10. State the tail behavior of $f(x) = -5x^3 - 6x^2 + 2x - 1$. Refer to the instructions for Exercises 11-18 on page 306 in Section 4.1 of the textbook, and classify the tail behavior as one of the pictures labeled a), b), c), or d).
11. State the tail behavior of $f(x) = 6x^8 - 3x^2 + 4$. Refer to the instructions for Exercises 11-18 on page 306 in Section 4.1 of the textbook, and classify the tail behavior as one of the pictures labeled a), b), c), or d).
12. Find the vertical asymptote of $f(x) = \frac{x-6}{(x-2)^2}$.
- a) $x = -3$ c) $x = 2$
 b) $x = 6$ d) $x = -2$
13. Determine the domain of $f(x) = \sqrt{x^2 + x - 12}$.
- a) $(-\infty, 4) \cup (3, \infty)$ c) $(-\infty, -4] \cup [3, \infty)$
 b) $(-\infty, -3] \cup [4, \infty)$ d) $[-4, 3]$

SHORT ANSWER SECTION. Be careful; there is no partial credit for these questions. (3 pts each)

Questions 14, 15, and 16 refer to the polynomial $f(x) = 3x(x-3)^2(x+2)^3(x^2-3)$. This function has five zeroes.

14. Determine the degree of this polynomial.
15. State the five zeroes.
16. State the multiplicity of each zero. Make it clear which multiplicity corresponds to which zero.

In Questions 17, 18, and 19, write in simplest $a+bi$ form.

17. $\frac{\sqrt{-49}\sqrt{25}}{-\sqrt{-100}}$

18. $(1-4i)(7+6i)$

19. $\frac{2-i}{3-2i}$

LONG ANSWER SECTION. Solve the problems. You must show all work in order to receive any credit.

20. Consider the quadratic function $f(x) = -x^2 + 2x + 8$

- a. Find the vertex. (4 pts)
- b. State whether there is a maximum or minimum value and find that value. (4 pts)
- c. Find the domain. (1 pt)
- d. Find the range. (2 pts)
- e. Find the interval(s) on which the function is increasing. (2 pts)
- f. Find the interval(s) on which the function is decreasing. (2 pts)
- g. Find the *coordinates* of the x -intercepts of the graph of this function. (4 pts)
- h. Find the *coordinates* of the y -intercept of the graph of this function. (3 pts)
- i. Sketch the graph of the function. (4 pts)

21. Suppose that $f(x) = \frac{5x}{x^2 - x - 6}$.

- a. Determine the domain of f . (5 pts)
- b. Determine the vertical asymptote(s), if any, of the graph of f . (6 pts)
- c. Determine the horizontal asymptote(s), if any, of the graph of f . (3 pts)
- d. Sketch the graph of f . (6 pts)

22. Classic Furniture Concepts has determined that when x hundred wooden chairs are built, the average cost per chair is given by $C(x) = 0.1x^2 - 0.7x + 1.625$, where $C(x)$ is in hundreds of dollars.

- a. How many chairs should be built to minimize the average cost per chair? (5 pts)
- b. What is the least average cost per chair? (5 pts)

23. A homeowner wants to fence a rectangular garden using 60 ft of fencing. An existing stone wall will be used as one side of the rectangle. Find the dimensions for which the area is a maximum. (10 pts)