Chapter 3 Review
Answer Section

MULTIPLE CHOICE

1. ANS: C  PTS: 1
2. ANS: B  PTS: 1
3. ANS: C  PTS: 1
4. ANS: A  PTS: 1
5. ANS: E  PTS: 1
6. ANS: E  PTS: 1
7. ANS: C  PTS: 1
8. ANS: D  PTS: 1
9. ANS: B  PTS: 1
10. ANS: D  PTS: 1
11. ANS: B  PTS: 1
12. ANS: B  PTS: 1
13. ANS: A  PTS: 1
14. ANS: B  PTS: 1
15. ANS: C  PTS: 1
16. ANS: C  PTS: 1
17. ANS: E  PTS: 1
18. ANS: B  PTS: 1
19. ANS: D  PTS: 1
20. ANS: D  PTS: 1
Chapter 3 Review

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. Sketch the graph of the function.

\[ P(x) = x^3(x + 1)(x - 3)^2 \]

- [a.]
- [b.]
- [c.]
- [d.]
- [e.]
2. The graph of a polynomial function is given.

Find the coordinates of all local extrema.

a. (0, 0)
b. (3, 3)
c. (3, -3)
d. (0, 0), (3, 3)
e. (2, 3)

3. Find the coordinates of all local extrema of the function.

\( y = x^3 - 12x + 6 \)

a. \( x = 2, y = 22 \) and \( x = -2, y = -10 \)
b. \( x = 2, y = -10 \) and \( x = 2, y = 22 \)
c. \( x = -2, y = -10 \) and \( x = -2, y = 22 \)
d. \( x = -2, y = -10 \) and \( x = 2, y = -22 \)
e. \( x = 2, y = -10 \) and \( x = -2, y = 10 \)

4. Find the quotient and remainder using long division.

\[
\frac{x^6 + 8x^4 + 15x^2 + 8}{x^2 + 1}
\]

a. The quotient is \( x^4 + 7x^2 + 8 \); the remainder is 0.
b. The quotient is \( x^2 - 7x - 8 \); the remainder is 0.
c. The quotient is \( x^4 - 7x^2 - 8 \); the remainder is 0.
d. The quotient is \( x^4 + 7x^2 - 8 \); the remainder is 0.
e. The quotient is \( x^4 - 7x^2 + 8 \); the remainder is 0.
5. Find the quotient and remainder using synthetic division.

\[
\frac{x^3 + 12x^2 + 34x + 68}{x + 9}
\]

a. The quotient is \(x^2 + 3x + 7\); the remainder is \(x^2 + 3x + 7\).
b. The quotient is \(x^2 + 3x - 7\); the remainder is 5.
c. The quotient is \(x^2 - 3x - 7\); the remainder is 5.
d. The quotient is 5; the remainder is \(x^2 - 3x + 7\).
e. The quotient is \(x^2 + 3x + 7\); the remainder is 5.

6. Find the quotient and remainder using synthetic division.

\[
\frac{2x^3 + 19x^2 + 6x - 72}{x - 1}
\]

a. The quotient is \(2x^2 - 21x + 27\); the remainder is −45.
b. The quotient is \(2x^2 + 21x - 27\); the remainder is −45.
c. The quotient is \(2x^2 + 21x + 27\); the remainder is −45.
d. The quotient is \(2x^2 - 21x - 27\); the remainder is 45.
e. The quotient is \(2x^2 + 21x + 27\); the remainder is −45.

7. Use synthetic division and the Remainder Theorem to evaluate \(P(-1)\), for \(P(x) = -3x^6 + 8x^5 + 44x^4 - 6x^2 + 9x + 116\).

a. 136
b. 135
c. 134
d. 137
e. 133

8. Find a polynomial of degree 5 and zeros of \(-6, -2, 0, 2, \) and 6.

a. \(x^5 - 40x^2 - 144x\)
b. \(x^5 + 40x^3 - 144x\)
c. \(x^5 + 40x^3 + 144x\)
d. \(x^5 - 40x^3 + 144x\)
e. \(x^5 - 40x^3 - 144x\)

9. List all possible rational zeros given by the Rational Zeros Theorem (but don't check to see which actually are zeros).

\(Q(x) = x^4 - 4x^3 - 5x + 8\)

a. 1, 8
b. ±1, ±2, ±4, ±8
c. −1, −2, −4, −8
d. 1, 2, 4, 8
e. ±1, ±8
10. Find all rational zeros of the polynomial.

\[ P(x) = x^4 + 11x^3 + 29x^2 - 11x - 30 \]

a. \( x = -1, x = 1, x = 5, x = -6 \)
b. \( x = 1, x = 3, x = -5, x = -6 \)
c. \( x = -1, x = -5, x = -6 \)
d. \( x = -1, x = 1, x = -5, x = -6 \)
e. \( x = -1, x = 1, x = -5, x = 6 \)

11. Find all rational zeros of the polynomial.

\[ P(x) = 2x^4 - 11x^3 + 11x^2 + 15x - 9 \]

a. \( x = -3, x = -1, x = \frac{1}{2} \)
b. \( x = 3, x = -1, x = \frac{1}{2} \)
c. \( x = 5, x = -1, x = \frac{1}{2} \)
d. \( x = 3, x = 1, x = \frac{1}{2} \)
e. \( x = -3, x = 1, x = \frac{1}{2} \)

12. Find the real and imaginary part of the complex number \( 8 - 3i \).

a. Real part = -3, Imaginary part = 8.
b. Real part = 8, Imaginary part = -3.
c. Real part = 3i, Imaginary part = 8.
d. Real part = 8, Imaginary part = -3i.

13. Find the real and imaginary part of the complex number \( \sqrt{3} + \sqrt{-10} \).

a. Real part = \( \sqrt{3} \), Imaginary part = \( \sqrt{10} \)
b. Real part = \( \sqrt{10} \), Imaginary part = \( \sqrt{3} \)
c. Real part = 3, Imaginary part = -10

d. Real part = \( \sqrt{-3} \), Imaginary part = \( \sqrt{-10} \)

14. Find all solutions of the equation \( x^2 + 49 = 0 \) and express them in the form \( a + bi \).

a. \( x = 7i \)
b. \( x = 7i, x = -7i \)
c. \( x = 7i, x = -7 \)
d. \( x = 7, x = -7 \)

15. Find all solutions of the equation \( z + 8 + \frac{20}{z} = 0 \) and express them in the form \( a + bi \).

a. \( z = 2 + 5i, z = 2 - 5i \)
b. No solutions

c. \( z = -4 + 2i, z = -4 - 2i \)
d. \( z = 4, z = -4 \)
16. Find all solutions of the equation $x^2 - 7ix = 0$.
   a. $7i$
   b. 7 and $-7$
   c. $7i$ and 0
   d. $-7i$ and 1
   e. $7i$ and $-7i$
17. Use transformations of the graph of $y = \frac{1}{x}$ to graph the rational function.

$$s(x) = \frac{3}{x-2}$$
18. Use transformations of the graph of \( y = \frac{1}{x} \) to graph the rational function.

\[ f(x) = \frac{4x - 3}{x - 1} \]
19. Find the x- and y-intercepts of the rational function \( r(x) = \frac{x^3 + 27}{x^2 + 9} \).
   a. x-intercept (-3, 2), y-intercept (0, 3)
   b. x-intercepts (3, 0), (-3, 0), y-intercept (0, 3)
   c. x-intercept (0, 0), y-intercept (0, 6)
   d. x-intercept (-3, 0), y-intercept (0, 3)
   e. x-intercepts (3, 0), (-3,0), y-intercepts (0, 3), (0, -3)

20. A drug is administered to a patient and the concentration of the drug in the bloodstream is monitored. At time \( t > 0 \) (in hours since giving the drug), the concentration (in mg/L) is given by the equation:

   \[
c(t) = \frac{50t}{t^2 + 4}.
   \]

Graph the function \( c \) with a graphing device.

What is the highest concentration of the drug?
   a. 14.5 mg/L
   b. 11.5 mg/L
   c. 13.5 mg/L
   d. 12.5 mg/L
   e. 15.5 mg/L