p. 445 - 447
1, 2, 4-6, 8-12, 22, 25-27, 31

(11.2)

1) $y = 5^x - 2$

NOT A POLYNOMIAL

{Exponential}

2) $y = 5 + x$

LINEAR

4) $y = 7t^6 - 8t + 7.2$

6th DEGREE

5) $y = 4x^4 - 3x^3 + 2e^x$

NOT A POLYNOMIAL

6) $y = 4x^2 - 7\sqrt{x^9} + 10$

$y = 4x^2 - 7x^{\frac{9}{2}} + 10$

NOT A POLYNOMIAL

{Exponents must be integers}

8) $y = 1 - 2x^4 + x^3$

QUARTIC - 4th DEGREE
3 TERMS
as $x \to \infty$ $y \to -\infty$
as $x \to -\infty$ $y \to -\infty$

9) $(x+4)(2x-3)(5-x)$ $-2x^3+5x^2+37x-60$

$-2x^3$

CUBIC - 3rd DEGREE
3 TERMS
as $x \to \infty$ $y \to -\infty$
as $x \to -\infty$ $y \to \infty$

10a) $\lim_{x \to \infty} (3x^2 - 5x + 7)$

$= \lim_{x \to \infty} (3x^2) = \infty$

b) $\lim_{x \to -\infty} (7x^2 - 9x^3)$

$= \lim_{x \to -\infty} (-9x^3) = \infty$

{Large negative cubed is larger negative times -9 is larger positive}

11.) Estimate Zeros of:

$f(x) = x^4 - 3x^2 - x + 2$

From graph: $x = .718$ and $x = 1.702$

12.) Estimate minimum value:

$g(x) = x^4 - 3x^3 - 8$

from graph: -16.543

22a) $f(x) = x^3 + x + 1$ passes the horizontal line test.

b.) $f(.5) = (.5)^3 + .5 + 1 = 1.625$

$f^{-1}(.5) \Rightarrow .5 = x^3 + x + 1$ intersection of $y = .5$, $y = x^3 + x + 1$

$= -.424$

25.) $y = 1 - .58t + 4.89t^2 - 1.872t^3 + .247t^4 - .0111t^5$

a.) graph $0 \le t \le 8$; $-2 \le y \le 12$

b.) Population when founded? (1890)

$y = 1 - 0 + 0 - 0 + 0 - 0 =$ 1 hundred people

c.) Population reach 0 at: $x = 7.540$

$.54 \times 12 = 6.48 =$ July 1897

d) LARGEST POPULATION? $10.060 =$ 1006 people

AT? $x = 3.124$ $.124 \times 12 = 1.488$ Feb 1893

e.) POPULATION IN 1898 $= -1.159$ hundred $= -116$

NOT POSSIBLE - COULD BE ZERO OR MODEL DOESN'T FIT WELL HERE

26.) Cost in millions of x thousand units:

$C(x) = 4(x-1)^2 + 4$

a.) Graph $C(x)$:

b.) Revenue (millions of $) from selling x thousand units:

$R(x) = 10x$

$10 million for 1 thousand units
or
$10,000 per unit

c.) When does firm: {find points of intersection}

Make Profit: $.5 < x < 4$ | $500 < x < 4000$ units

Break Even: at 500 and 4000 units

Lose Money: $0 \leq x < 500$ and $x > 4000$ units

27.) $V = .1729t + .1522t^2 - .0347t^3$

V = volume in liters in 5 sec cycle

a.) Graph for $0 \leq t \leq 5$ {use $0 \leq y \leq 1$ for y}

b.) Max Value: $V = .886$ at

$t = 3.195$

Lungs contain .886 liters 3.195 seconds into the cycle.

c.) The volume is zero at $t = 0$ and $t \geq 5$. The lungs are empty at the start and end of the 5 second cycle.

31.) g is polynomial of degree n where n is positive odd integer.

a.) g is an odd function

False - $g(x) = x^5 + x^2$ is not odd.

NOT SYMMETRIC ABOUT THE ORIGIN AND $g(-x) \neq -g(x)$

$(-x)^5 + (-x)^2 = -[x^5 + x^2]$

$-x^5 + x^2 \neq -x^5 - x^2$

b.) g has an inverse

FALSE - $g(x) = (x-3)(x-2)(x-1)$ has zeros at $x = 3$, $x = 2$ and $x = 1$ which will cause the function to fail the horizontal line test

c.) $\lim_{x \to \infty} g(x) = \infty$

FALSE - if $g(x) = -x^3$ (or when the lead coefficient is negative) the limit will approach negative infinity (cube first, then make negative.

d.) If $\lim_{x \to -\infty} g(x) = -\infty$ then $\lim_{x \to \infty} g(x) = \infty$

TRUE - If $\lim_{x \to -\infty} = -\infty$ Then the leading coefficient (a_n) must be positive and the limit of $g(x) = a_n x^n$ will be positive infinity.