Pg. 103 1.10 – Mathematical Modeling and Variation

Direct Variation (Multiplication)

The following statements are equivalent.

1. y varies directly as x.
2. y is directly proportional to x.
3. $y = kx$ for some nonzero constant k.

k is the constant of variation or the constant of proportionality.

Ex 1:
Assume that y is directly proportional to x. Use the given x-value and y-value to find a linear model that relates y and x.

$x = 2, y = 14$

Ex 2:
Simple Interest The simple interest on an investment is directly proportional to the amount of the investment. By investing $5,000 in a municipal bond, you obtained an interest payment of $187.50 after 1 year. Find a mathematical model that gives the interest I for the municipal bond after 1 year in terms of the amount invested P.

Direct Variation as an nth Power (Multiplication)

The following statements are equivalent.

1. y varies directly as the nth power of x.
2. y is directly proportional to the nth power of x.
3. $y = kx^n$ for some constant k.

Ex 3:
Find a mathematical model for the verbal statement.

V varies directly as the cube of e

Ex 4:
Write a sentence using the variation terminology to describe the formula.

Surface area of a sphere: $S = 4\pi r^2$

Inverse Variation (Division)

The following statements are equivalent.

1. y varies inversely as x.
2. y is inversely proportional to x.
3. $y = \frac{k}{x}$ for some constant k.

Ex 5:
Find a mathematical model for the verbal statement.

h varies inversely as the root of s.

Ex 6:
Write a sentence using the variation terminology to describe the formula.

Volume of Enclosed Gas: $V = \frac{kT}{P}$

Joint Variation (Multiplication)

The following statements are equivalent.

1. z varies jointly as x and y.
2. z is jointly proportional to x and y.
3. $z = kxy$ for some constant k.

Ex 7:
Find a mathematical model for the verbal statement.

z is jointly proportional to the square of x and the cube of y.

Ex 8:
Find a mathematical model representing the statement. Find the constant of proportionality.

v varies jointly as p and q and inversely as the square of s. (v = 1.5 when p = 4.1, q = 6.3, and s = 1.2.)

Assignment 1.10

Pg. 109 Vocab #'s 4-9 ALL Problem Set #'s 25-29 ODD, 35-67 ODD