3/4 MON

Ch 2.8 Modeling Using Variation

Types of Variations

Find "k"

- Direct Variation $y = kx$
- Inverse Variation $y = \frac{k}{x}$
- Joint Variation $y = kx \cdot w \cdot \ldots$ two or more variables
- Combined Variation $y = \frac{k \cdot x \cdot v}{w \cdot z}$

k = constant of variation

ex 1) The distance (d) that a body falls from rest varies directly as the square of the time (t). If sky divers fall 64 ft. in 2 seconds, how far will they fall in 4.5 seconds? find k.

$d = k \cdot t^2$

$64 = k \cdot 2^2$

$\frac{64}{2^2} = k$

Rewrite the formula w/ the known value for k.

$d = \frac{64}{2^2} \cdot t^2$ or $d = 16t^2$

k or $= 16$

$d = 16 \cdot (4.5)^2$

$d = 324 \text{ ft}$

ex 2) The length (l) of a violin string varies inversely as the frequency (f) of its vibrations. A string 8 in. long vibrates at a frequency 640 cycles per second. What is the frequency of a 10 in. string?

$l = \frac{k}{f}$

$8 = \frac{k}{640}$

$8 \cdot 640 = k$

$5120 = k$

$l = \frac{5120}{f}$?

$10 = \frac{5120}{f}$ ... $f = \frac{5120}{10}$

swap

$= 512 \frac{\text{cycles}}{\text{sec}}$ Hertz

ex 3) The minutes (M) needed to solve a set of variation problems varies directly as the number of problems (z) & inversely as the number of people (p) working together. If 4 people take 32 minutes to solve 16 problems, how long will 8 people to solve 24 problems? (k?)

$M = \frac{k \cdot z}{p}$

$32 = \frac{k \cdot 16}{4}$

$32 = 4k$

$8 = k$

$M = \frac{8 \cdot z}{p}$

$M = \frac{8 \cdot 24}{8} = 24$ minutes

ex 4) Volume (V) of cone varies jointly as its height (h) and square of its radius (r). If radius is 6 and height is 10... volume is $120\pi\ ft^3$, find volume (?) if radius is 12 & height is 2.

$V = k \cdot h r^2$

$120\pi = k \cdot 10 \cdot 6^2$

$\frac{120\pi}{360} = \frac{k \cdot 360}{360}$

$\frac{1}{3}\pi = k$

$V = \frac{1}{3}\pi h r^2$

$= \frac{1}{3}\pi(2)(12)^2$

$= \frac{288\pi}{3} = 96\pi\ ft^3$

or...

HW: pg 376, #11-35 (by 3's)