MATH 101-26 (101)
QUIZ # 6

NAME: Solution ID. #: .....

Q1. The area of a circle is increasing at the rate of π cm^2/min. At what rate is the radius increasing when the area is 9π cm^2?

$A = \pi r^2$ (1) $\quad \frac{dA}{dt} = \pi \ cm^2/min$, $\frac{dr}{dt}$?

$A = 9\pi \Rightarrow 9\pi = \pi r^2$

$9 = r^2 \Rightarrow r = 3$ (1)

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt} \Rightarrow \frac{dr}{dt} = \frac{\pi}{2\pi(3)} = \frac{1}{6}$ cm/min

(1) (1)

Q2. The three dimensions of a box are increasing at the rate of 5 cm/min, 7 cm/min, and 2 cm/min. At what rate is the volume increasing at the moment when the box is a cube with edge 10 cm?

(1) (1)

$\frac{dx}{dt} = 5$, $\frac{dy}{dt} = 7$, $\frac{dz}{dt} = 2$ cm/min, $\frac{dV}{dt}$? when $x = y = z = 10$

(1)

$V = xyz \Rightarrow \frac{dV}{dt} = \frac{dx}{dx} xy + \frac{dy}{dt} xz + \frac{dz}{dt} xy$

$\frac{dV}{dt} = 5(100) + 7(100) + 2(100) = 1400 \ cm^3/min$ (1)

Q3. The radius of a circle is increased from 2.00 to 2.02 m. Estimate the resulting change in area.

$A = \pi r^2 \Rightarrow dA = 2\pi r \, dr$ (1)

$dr = 2.02 - 2.00 = 0.02$

$\Rightarrow dA = 2\pi(2)(0.02) = 0.08\pi \ m^2$ (1)