1.11 / 1.13

Average Rate of Change

$$AROC = m = \frac{f(b) - f(a)}{b - a}$$

EX #1 Find the average rate of change of the area of a circle as its radius r changes from 8 to some number x. Then determine the average rate of change of the area of a circle as the radius changes from 8 to 8.4.

$A_{circle} = \pi r^2$

$r_1 = 8 \quad A_1 = 64\pi$

$r_2 = x \quad A_2 = \pi x^2$

$$AROC = \frac{A(x) - A(8)}{x - 8}$$

$$= \frac{\pi x^2 - 64\pi}{x - 8}$$

$$= \pi \frac{(x-8)(x+8)}{x-8}$$

$$\boxed{AROC = (x+8)\pi}$$

$$\boxed{AROC\Big|_{x=8.4} = 16.4\pi}$$

AROC & Position Functions

average change in position = average velocity

" " " velocity = " acceleration

Point-Slope Form

$$y - y_1 = m(x - x_1)$$

Ex #2 (#207 on 1.13)

a) average velocity $= \frac{p(4)-p(1)}{4-1}$

$= \frac{6+2}{3}$

average velocity $= \frac{8}{3}$

b) $y - y_1 = m(x - x_1)$

$y + 2 = \frac{8}{3}(x-1)$ or $y - 6 = \frac{8}{3}(x-4)$

c) positive velocity for ~~t~~ $\in (1,2) \cup (3,4)$ / $\{t \mid t \in \mathbb{R}, t \neq 1,2$

negative velocity for ~~t~~ $\in (-1,1) \cup (2,3)$ /