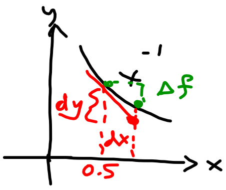
p.243 #33

$f(x)=x^{-1}$ $a=0.5$ $dx=.05$



(a) Δf (actual)

$= f(a+dx) - f(a)$

$= (0.5+.05)^{-1} - (0.5)^{-1}$

$= 1.81818 - 2$

$\Delta f = \underline{\underline{-0.1818}}$ (approx.)

(b) $= df \approx f'(a)\cdot dx$

$f'(x) = -x^{-2}$

$f'(0.5) = -4$

$df \approx -4 \cdot .05 = \underline{\underline{-.2}}$

(c) $|(-.2)-(-.1818)|$

$= \underline{\underline{0.182}}$

$h = 500 \tan \theta$

variable variable

both dependent on time.

as t increases,
h increases,
θ increases

1. $\frac{dh}{dt} = 500 \sec^2\theta \cdot \frac{d\theta}{dt}$

rate rate

find $\frac{dh}{dt}$ when $\theta = \frac{\pi}{4}$ $\frac{d\theta}{dt} = .14$

2. plug in values that are known.

#1 $A = \pi r^2$

relate $\frac{dA}{dt}$ to $\frac{dr}{dt}$

$$\frac{dA}{dt} = \pi \cdot 2r \cdot \frac{dr}{dt}$$

$$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$$

Even answers:

#2 $\frac{dS}{dt} = 8\pi r \frac{dr}{dt}$

#4 (a) $\frac{dP}{dt} = 2RI \frac{dI}{dt} + I^2 \frac{dR}{dt}$

(b) $0 = 2RI \frac{dI}{dt} + I^2 \frac{dR}{dt}$

or

$$\frac{dR}{dt} = -\left(\frac{2R}{I}\right)\left(\frac{dI}{dt}\right)$$

$$= \left(-\frac{2P}{I^3}\right)\left(\frac{dI}{dt}\right)$$

#6 $\frac{dA}{dt} = \frac{1}{2}\left(b \sin\theta \frac{da}{dt} + a \sin\theta \frac{db}{dt} + ab\cos\theta \frac{d\theta}{dt}\right)$