Additinal Diff. Eqns. 1

What is the formula for Euler's method of approximation?

x	$\left[\frac{dy}{dx}$ OR slope OR $f'(x)\right] \cdot [\Delta x]$	y
	Always use previous x and y	

Additional Diff. Eqns 2

Use Euler's method with step size 0.2 to estimate y(0.4), where y(x) is the solution of $y' = x + y^2$ & $y(0) = 0$

x	$\frac{dy}{dx}[\Delta x]$	y
0	$[x+y^2][.2]$	0
.2	$[0+0^2](.2)$ $(0)(.2)$ 0	$0+0$ $= 0$
.4	$[.2+0^2](.2)$ $[.2](.2)$ $.04$	$0+.04$ $= .04$

$y(.4) \approx .04$

Additional Diff. Eqns. 3

If you have a logistic equation

→ What is $\frac{dP}{dt} =$

→ What is $P(t) =$

→ How do you find C?

$$\frac{dP}{dt} = KP\left[1 - \frac{1P}{A}\right]$$ must be 1.

K = growth rate

A = carrying capacity

$$P(t) = \frac{A}{1 - \frac{e^{-Kt}}{C}}$$ And $$C = \frac{P_0}{P_0 - A}$$

Where P_0 is the initial value

Additional Diff. Eqns. 4

$$\frac{dP}{dt} = 0.2P - .001P^2$$

What does $P(t) = ?$

If $P(0) = 25$

$$\frac{dP}{dt} = 0.2P - .001P^2 \quad \& \quad P(0) = 25$$

$$\frac{dP}{dt} = .2P\left[1 - \frac{.001P}{.2}\right] = .2P\left[1 - \frac{P}{200}\right]$$

$K = .2 \quad A = 200$

$$C = \frac{25}{25-200} = \frac{25}{-175} = -\frac{1}{7}$$

$$P(t) = \frac{A}{1 - \frac{e^{-Kt}}{C}} = \frac{200}{1 + 7e^{-.2t}}$$