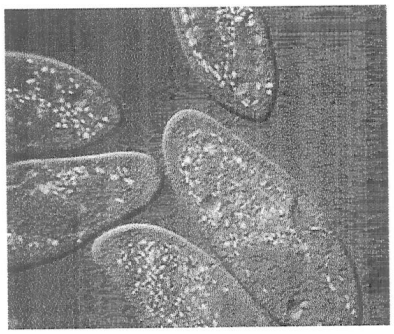
Mathematics 172

Quiz 16 Name: Key

***You must show your work to get full credit.***



Let $P(t)$ be a number of paramecium in a small puddle. Assume that the carrying capacity is 900 paramecium and that the intrinsic growth rate is .02(paramecium/day)/paramecium.

**1.** What is the rate equation equation for $P$?

We are assuming logistic growth here (which I should have said explicitly). So $\frac{dP}{dt} = rP(1-\frac{P}{K})$ with $r=.02$ $K=900$

The rate equation is: $\frac{dP}{dt} = .02P(1-\frac{P}{900})$ or $P' = .02P(1-\frac{P}{900})$

**2.** What is $P'(3)$, if $P(3) = 600$?

$P'(600) =$ 4.0

$P'(3) = .02P(3)(1-\frac{P(3)}{900})$

$= .02(600)(1-\frac{600}{900})$

$= 4.0$

**3.** Use your answer to the last problem to estimate the number of paramecium when $t = 3.5$.

$P(3.5) \approx P(3) + P'(3)(.5)$

$= 600 + 4(.5)$

$= 602$

$P(3.5) \approx$ 602