Mathematics 172

Quiz 7 Name: Key

You must show your work to get full credit.

In this quiz we will use Euler's method with on the logistic equation initial value problem:

$$\frac{dP}{dt} = rP\left(1 - \frac{P}{K}\right), \qquad P(0) = 55$$

with a step size of $h = .1$,

$$r = .25, \qquad K = 50$$

and plot the solution.

1. Start by storing .1 in the H register, .25 in the R register, and 50 in the K register.

2. Use the MODE menu to change the mode to SEQ.

3. Do 2ND to set TblStart = 0 and Δ Tbl =1. Both of Intdent: and Depend: should be on Auto.

4. Use the Y= key and set nMin =0 and \u(n)=u($n-1$) + R u($n-1$)(1 - u($n-1$)/K)

5. Do 2ND TABLE and scroll down to find find the approximation of $P(1.2)$ gotten from doing 12 steps of length $h = .1$.

$P(1.2) \approx$ 50.14

6. Go to the WINDOW menu and set nMin = 0 and nMax = 50. Now do a 0:ZoomFit to get a plot of the solution. Give a drawing of what you get here:

7. Now do 2ND CALC and 1:Value and give the calculator the value $n = 35$.

(a) What is the result? $Y = u(35) =$ 50.0002

(b) The number $u(35)$ is the approximation of what? $u(35) \approx$ P(35)

8. What is the approximation of $P(5)$ obtained by doing 50 Euler steps of size $h = .1$.

$P(5) \approx$ 50.000002