Math 172 Spring 2011 Worksheet 1

1. If $N = N(t)$, $\Delta N = 3$, and $N(0) = 5$, find $N(1), N(2), N(3), N(4), N(5)$ and the general formula for $N(t)$.

2. If $P = P(t)$, $\Delta P = 0.03P$, and $P(0) = 10$, find $P(1), P(2), P(3), P(4), P(5)$, and the general formula for $P(t)$. What happens to the values of $P(t)$ in the long run?

3. Consider a bird population in which the net gain is proportional to the size of the population. You are told that a flock of 10,000 birds gains 150 birds in one year.

a. How much will a flock of 60,000 birds gain?

b. Use the given information to determine a general formula for $P(t)$, using an arbitrary constant P_0 for the initial value of the population.

4. In 1985 the per capita growth rate of Poland was 9 persons per year per 1000 persons.

a. Write the dynamic model equation for the population P of Poland (that is, write a differential equation for dP/dt).

b. The population of Poland in the beginning of 1985 was 37.5 million. What was the net growth rate of the population at that time, including units?

5. During the 1980's, Costa Rica had a deforestation rate of 2.9% per year. Deforestation (meaning loss of forested land) is assumed to be a continous process. Let $F(t)$ denote the amount of forested land at time t.

a. Write the dynamic model equation for this process.

b. Give the explicit solution for $F(t)$ (in terms of an arbitrary initial amount of forested land, F_0). What happens to the values of $F(t)$ in the long run?

c. What percentage of the inital amount of forested land, F_0, is still forested ten years later?

6. The table below gives values for a function $N = N(t)$. Use the table to give the difference equation for N, and determine the general formula for $N(t)$.

t	0	1	2	3	4
N	2	5	8	11	14

7. The table below gives values for a function $N = N(t)$. Use the table to give the difference equation for N, and determine the general formula for $N(t)$.

t	0	1	2	3	4
N	3	6	12	24	48