NAME: _____

Math 180, Calculus I   **Hour Exam One**
9:00 am Lecture   **October, 1996**

1. The following table gives the number $Q(t)$ of rabbits after t months.

t	0	1	2	3	4	5
$Q(t)$	20	32	51	81	131	209

   (i) Find a formula for $Q(t)$ assuming exponential growth.

   (ii) Predict when the rabbit population will reach 5000.

2. Give a formula for a function which has the following graph.

3. Which of the following functions is linear, which is concave up, and which is concave down? Justify your choices.

x	1	2	3	4	5	6
$f(x)$	8	13	17	20	22	23
$g(x)$	5.0	5.7	6.4	7.1	7.8	8.5
$h(x)$	5.3	6.0	6.8	7.7	8.7	9.8

4. Suppose that $f(T)$ is the cost in dollars per day to heat my house when the outside temperature is T degrees Fahrenheit. What does $f'(23) = -0.17$ mean in practical terms?

5. Suppose $f(x) = (1 + \cos x)^x$. Calculate $f'(2)$ to two decimal places. Explain what calculations you are making. Don't forget to set your calculator to radian mode.

6. $f(2) = 3$ and $f'(2) = 5$.

   (a) Write the formula for the tangent line approximation to f at $x = 2$.

   (b) Estimate $f(1.7)$.