

2. (15 points) Tables for the five functions, $f(x)$, $g(x)$, $h(x)$, $p(x)$, and $q(x)$, are shown below. Write the word **linear** by each function which could be linear, and write the word **exponential** by each function which could be exponential. There may be more than one function of each type, and some functions may be neither linear nor exponential. You do not need to find formulas for any of the functions.

x	$f(x)$
0	0.06
5	0.18
10	0.54
15	1.62

x	$g(x)$
0	0.02
5	0.17
10	0.32
15	0.47

x	$h(x)$
0	20
5	17
10	14
15	11

x	$p(x)$
0	5
5	10
10	60
15	560

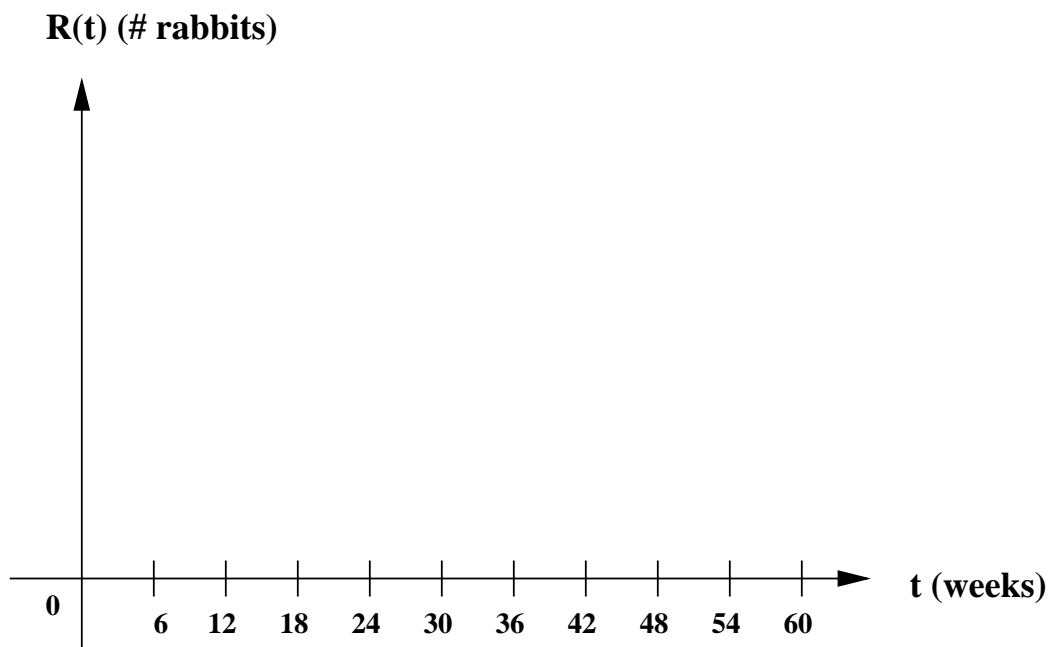
x	$q(x)$
0	64
5	48
10	36
15	27

3. (15 points) A biologist studied the growth of a rabbit population in a field. She found that the number of rabbits was approximated by the function $R(t) = 20 + 25t(0.92)^t$ where t represents the number of weeks since the start of her research.

(a) Estimate $R(6)$ and interpret it in terms of rabbits.

(b) What was the average rate of change in the rabbit population during the first six weeks of her research? Round off your answer to two decimal places.

(c) **Carefully** sketch a graph of the rabbit population during the first 60 weeks of her research. Mark off enough numbers along the y -axis to clearly show important points such as the y -intercept as well as the highest point on the graph.



4. (18 points) The Nike company manufactures and sells a new type of running shoe. The total manufacturing costs to Nike consist of fixed costs of \$650,000 plus production costs of \$25 per pair of shoes. Each pair of shoes is sold for \$75. Let q denote the number of pairs of shoes produced.

(a) Give formulas for the cost function $C(q)$ and the revenue function $R(q)$ for this new shoe.

(b) If Nike produces and sells 10,000 pairs of these shoes, do they earn a profit or suffer a loss? How much (in dollars) is the amount of this profit or loss?

(c) How many pairs of shoes must be produced and sold in order for Nike to break even?

5. (9 points) Iodine-131, which has a half-life of 8 days, is used in the treatment of hyperthyroid. Suppose that it takes 3 days to send a shipment of Iodine-131 from the producer to the hospital. What percentage of the original amount shipped actually arrives at the hospital?

6. (15 points) Bob's Guitar Store is having a going-out-of-business sale. During the 1st week of the sale, each guitar will be sold at 5% off the original price. During the 2nd week of the sale, each guitar will be sold at 5% off the first week's price. During the 3rd week of the sale, each guitar will be sold at 5% off the second week's price. This pattern continues so that during a given week of the sale, each guitar will be sold at 5% off the previous week's price. The guitar you are interested in purchasing has an original price of \$2000.

(a) Write a formula which will give the price of this guitar during week t of the sale.

(b) How much will this guitar cost during the fifth week? Round off your answer to two decimal places.

(c) When will this guitar finally be sold at half its original price? Round off your answer to one decimal place.

7. (10 points) Given that $1000e^{0.2t} = 2500$,

(a) find the exact value of t using logarithms.

(b) find an approximate value for t and round off your answer to two decimal places.