Math 118 groupwork §4.1

Introduction to exponential functions

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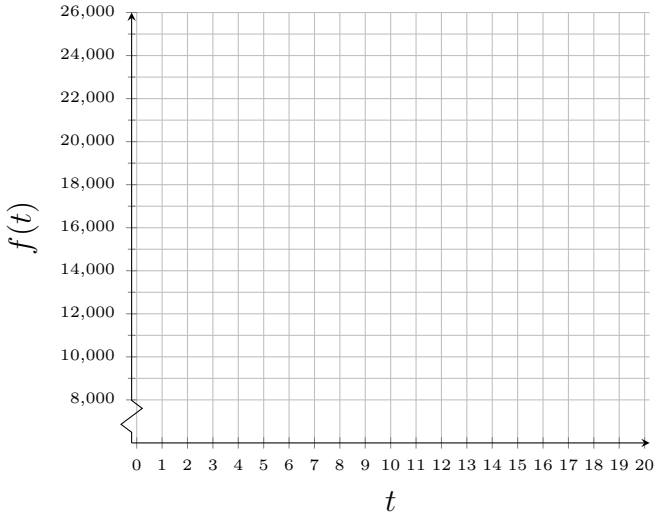
1. Suppose \$8 000 is invested in an account such that the balance of the account increases by 6% each year.

   (a) Fill in the following table giving the account balance $f(t)$ after t years

t (years)	0	1	2	3	5	10	15	20
$f(t)$	8 000	8 480						

   (b) Draw a graph for the account balance.



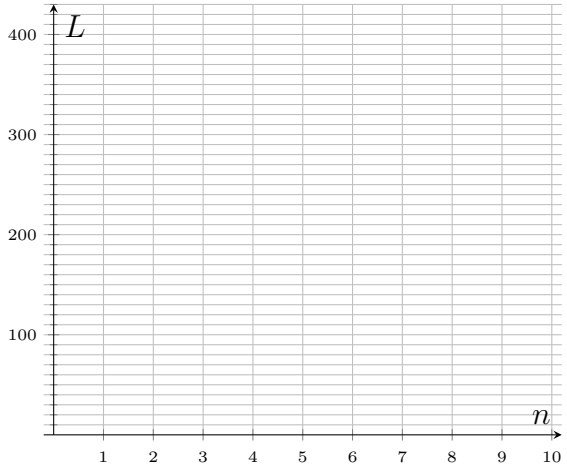
   (c) Write an expression for $f(t)$

2. A lake is polluted with toxic substance X. Each year, 55% of the remaining substance X is washed downstream and replaced by clean water. Initially, the lake water contains substance X at a level of 420 parts per million (ppm).

   (a) Fill in the table giving L, the remaining level of substance X, after n years.

n	0	1	2	3	5	10
L	420	189				

   (b) Draw the graph of L



   (c) Write an expression for L as a function of n.

3. The population (in thousands) after t years of Alphaville is given by the function $a(t)$, and the population (in thousands) of Betatown after t years is given by $b(t)$:

$$a(t) = 2.4 \times 1.033^t$$
$$b(t) = 4.3 \times 0.985^t$$

(a) Find the initial (i.e. "year zero") population of each town.

(b) One town has an increasing population, and one town has a decreasing population. Which is which? Explain in a sentence how you know.

(c) For each town, what is the percent increase or decrease for the population each year?

(d) Will there be a time when the towns' populations are the same? If so, estimate that time, or explain why it won't ever happen.