Name_____ IB Math Applications Date_____

5.5 - Practice Problems

Practice Problem #1

Saul bought a new bicycle for US$350. Every year the value of the bicycle decreased by 12%. Find the value of the bicycle at the end of five years.

Practice Problem #2

The school fees increase each year by the rate of inflation. When Barnaby joined the school, the fees were UK£9500. At the end of the first year the rate of inflation was 1.16%.

a Find the cost of the school fees for the second year.

The following year the rate of inflation was 1.14%.

b Find the cost of the school fees for the third year.

Practice Problem #3

Wei invested SGD 3000 (Singapore dollars) in a bank that paid 2.35% interest per year compounded monthly.

a Find how much Wei had in the bank after six years.

b Find the number of years before he had SGD 5000 in the bank.

Practice Problem #4

Nathalie borrows €6500 for a motorcycle. The loan is for five years at 2.5% interest per annum. Find how much Nathalie's monthly payments are.

Practice Problem #5

The temperature, T°C, of a cup of soup can be modelled by the equation $T(x) = 21 + 74 \times (1.2)^{-x}$, where x is the time in minutes.

a Find the initial temperature.

b Find the temperature after 10 minutes.

c Find how many minutes it takes for the soup to reach 40°C.

d Write down the room temperature.

Practice Problem #6

The spread of a disease can be modelled by the equation $y = 4 + e^x$, where x is the time in days.

a Find the number of people with the disease after seven days.

b Find the number of days it takes for 25 000 people to be affected.

Practice Problem #7

P1: In a controlled experiment, the temperature T°C of a liquid, t hours after the start of the experiment, is $T = 25 + e^{0.4t}$, $0 \le t \le 12$.

a Sketch the graph of the temperature $T = T(t)$ for $0 \le t \le 12$. (2 marks)

b State the temperature halfway through the experiment, to the nearest 0.1°C. (1 mark)

c Find the time at which the temperature of the liquid reaches 100°C. Give your answer in hours and minutes, to the nearest minute. (3 marks)

Practice Problem #8

P1: In a research laboratory, biologists studied the growth of a culture of bacteria. From the data collected hourly, they concluded that the culture increases in number according to the formula

$$N(t) = 35 \times 1.85^t$$

where N is the number of bacteria present and t is the number of hours since the experiment began.

Use the model to calculate:

a the number of bacteria present at the start of the experiment (1 mark)

b the number of bacteria present after four hours, giving your answer correct to the nearest whole number of bacteria (2 marks)