Module 4 Assignment 2 Questions

Question 1 (3 points)

A population of bacteria is observed to double in number. If a single bacterium is placed into a test-tube, after how many minutes will the test-tube contain 600 such bacteria? Please show all working out.

Question 2 (2 points)

Sketch the graphs of the functions $y = 2^x$ and $y = 10^x$ and state three features common to both.

Question 3 (2 points)

Sketch the graph $y = 10^{-x}$ and explain the differences between $y = 10^{x}$ and $y = 10^{-x}$.

Question 4 (2 points)

Use the logarithm rules to show that

$$\log\left(\frac{5}{36}\right) - \log\left(\frac{5}{9}\right) = -\log 4$$

Make sure to show all your working out to prove that the LHS=RHS

Question 5 (2 points)

When I sold my car to a friend, it was five years old, and we agreed that it had depreciated at a rate of 15% each year from its original cost price of \$20,000. What was the value of the car when it was sold?

Choose the best available answer below.

A. \$9,887.00
B. \$5,000.00
C. \$15,000.00
D. \$8,874.00

Question 6 (2 points)

The formula dB = 20 log S - 26 approximately describes the relationship between the pressure of a sound in micropascals S and its reading on the decibel scale dB. If a bird singing produces a sound pressure of about 400 μPa , and a Jumbo Jet produces a reading of 100 Pa, use the formula to convert these to their corresponding decibel values. Please show all working out.

Question 7 (3 points)

Caesium 137 is the principal source of radioactive contamination in the food chain mainly due to the nuclear testing in the 40s and 50s and the Chernobyl accident. Many wines were bottled from grapes containing this isotope. If a bottle from 1950 contained 10 milligrams when it was bottled, and Caesium 137 has a half-life of 30 years; in which year would the bottle have one milligrams remaining?

Use the radioactive decay formula $A = A_0 e^{-kt}$, where A is the amount remaining at the time *t*. A_0 is the amount present initially and *k* is the decay constant.

Please show all working out.