

Practice Test No. 2

Show all of your work, label your answers clearly, and do not use a calculator.

Problem 1

a Describe in words what it means for a function to be one-to-one (Your answer shouldn't just be "it passes the horizontal line test.")

b Why do non-one-to-one functions not have inverse functions?

c What is the inverse function of $f(x) = 5x^3 + 2$?

d What is the inverse function of $f(x) = 3e^{5x}$?

Problem 2

a If you deposit \$300 in a savings account that pays 3% annual interest, compounded monthly, how much money would you have after 4 years?

b If you deposit \$300 in a savings account that pays 3% annual interest, compounded continuously, how much money would you have after 4 years?

c If \$300 in a savings account compounded continuously grows to \$500 after 18 years, what was the annual interest rate?

Problem 3

a One day you discover an unidentified radioactive isotope in your lab. If you start with 4 grams of the isotope, and then 6 years later you run a test and find that only 1.3 grams of the material is remaining, what must the half-life of your isotope be?

b What function models the amount of radioactive isotope as a function of time in years?

c How many years until you would only have 0.2 grams of the isotope?

Problem 4 Graph the following functions, remembering to plot at least two points on each graph:

a $3e^x + 5$

b $\ln(x + 1) - 2$

Problem 5 Solve the following equations:

a $4 \log_3(2t - 7) = 8$

b $\ln(x - 5) = \ln(x + 4) - \ln(x)$

c $3e^{2x} - 2e^x - 25 = 0$

Problem 6 The population of Canada $P(t)$ (in millions) since January 1, 1990, can be approximated by

$$P(t) = \frac{55.1}{1 + 9e^{-0.02515t}}$$

where t is the number of years since January 1, 1990.

a Evaluate $P(0)$ and interpret its meaning in the context of this problem.

b Use the function to approximate the Canadian population on January 1, 2015.

c From the model, when would the Canadian population be 45 million?

d Determine the limiting value of $P(t)$.

Problem 7 A bank account will be opened, and the interest rate is 2.7% compounded quarterly. How long will it take the money to triple?