

## 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?