7 Review

1. Suppose a principal of P dollars is invested at 3.75% compounded annually. After n years, the amount is \$5000. This situation is modelled by the equation $P = 5000(1.0375)^{-n}$, where P is the present value.
   a) How much should be invested today to have \$5000 after 10 years?
   b) Suppose \$3000 are invested today. How long will it take until the amount is \$5000?

3. Write in exponential form.
   a) $\log_2 32 = 5$ b) $\log_3 3 = 1$ c) $\log_{10} 1 = 0$
   d) $\log_4\left(\frac{1}{16}\right) = -2$ e) $\log_5 0.008 = -3$ f) $\log_8 64 = 2$

4. Write in logarithmic form.
   a) $2^{10} = 1024$ b) $10^2 = 100$ c) $10^{-2} = 0.01$
   d) $25^{\frac{1}{2}} = 5$ e) $16^{\frac{3}{2}} = 64$ f) $1296^{0.25} = 6$

5. Evaluate each logarithm.
   a) $\log 1$ b) $\log 10\,000$ c) $\log_3 729$
   d) $\log_9\left(\frac{1}{9}\right)$ e) $\log_4 0.0625$ f) $\log_2 0.125$

6. Simplify each expression.
   a) $\log 10^4$ b) $\log_4 4^5$ c) $10^{\log 1000}$ d) $2^{\log_2 4}$

7. Solve each equation to 4 decimal places. Check the solution.
   a) $10^x = 15$ b) $9^x = 30$ c) $8^x = 3$
   d) $5^x = 100$ e) $3^x = 2$ f) $2^x = 3$

8. The number of mutual funds available in Canada, M, is modelled by the equation $M = 460(1.19)^n$, where n is the number of years since 1989.
   a) When will the number of mutual funds reach 10 000?
   b) How many years will it take for the number of mutual funds to triple?

10. Radioactive tritium has a half-life of 12 years. A sample of this material has a mass of 1000 g. An equation that models the mass, m grams, remaining after t years is $m = 1000(0.9439)^t$.
    a) How much radioactive tritium remains after 100 years?
    b) How long does it take until only 100 g of the radioactive tritium remain?

15. Two historical purchases of land in North America are given. In each case, if the money had been invested at 6% compounded annually, what would its value be today?
    a) In 1867, the United States purchased Alaska from Russia for \$7 200 000.
    b) In 1626, Manhattan Island was sold for \$24.

7 Review, page 393

1. a) \$3460.10 b) 13.9 years
3. a) $2^5 = 32$ b) $3^1 = 3$ c) $10^0 = 1$
   d) $4^{-2} = \frac{1}{16}$ e) $5^{-3} = 0.008$ f) $8^2 = 64$
4. a) $\log_2 1024 = 10$ b) $\log 100 = 2$
   c) $\log 0.01 = -2$ d) $\log_{25} 5 = \frac{1}{2}$
   e) $\log_{16} 64 = \frac{3}{2}$ f) $\log_{1296} 6 = 0.25$
5. a) 0 b) 4 c) 6
   d) −1 e) −2 f) −3
6. a) 4 b) 5 c) 1000 d) 4
7. a) 1.1761 b) 1.5480 c) 0.5283
   d) 2.8614 e) 0.6309 f) 1.5850
8. a) 2006–2007 b) 6.3 years
9. a) 3 b) 5 c) 2 d) 3
10. a) 3.11 g b) Approximately 40 years
15. Answers may vary. For 2002:
    a) $\$1.88 \times 10^{10}$ b) $\$7.86 \times 10^{10}$