Review Homework

pp. 393-394 #1a, 3-6, 7b, 8, 10(a,b)
Challenge Problem #15a

p. 393

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?

$A = P(1+i)^n$

$\frac{A}{(1+i)^n} = P$

$A(1+i)^{-n} = P$

$A = 5000$

$n = 10$

$P = 5000(1.0375)^{-n}$

$= 5000(1.0375)^{-10}$

$= 3460.102$

$= \$3460.10$

p. 393

$10^3 = x$ $a^b = x \Rightarrow \log_a x = b$

6. Simplify each expression.

a) $\log 10^4 = x$

$= 4 \log 10$

$= 4 \dfrac{\log 10}{\log 10}$

$= 4$

b) $\log_4 4^5$

$= 5 \times \log_4 4$

$= 5 \times \dfrac{\log 4}{\log 4}$

$= 5$

c) $10^{\log 1000} = x$

$\log_{10} x = \log 1000$

$\log_{10} x = \log_{10} 1000$

d) $2^{\log_2 4} = y$

$\log_2 y = \log_2 4$

$y = 4$

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? Note: 2002

a) In 1867, the United States purchased Alaska from Russia for $7 200 000.

b) In 1626, Manhattan Island was sold for $24.

$n = 2002 - 1867$

$= 135$

151

$A = P(1+i)^n$

$= 7\,200\,000(1.06)^n$

$= 7\,200\,000(1.06)^{135}$

$\doteq 1.877691789 \times 10^{10}$

$(\quad)^{151}$

18 776 917 890

b) $n = 2018 - 1626$

$= 392$

$A = 24(1.06)^{392}$

$= 1.99\ldots \times 10^{11}$

$= 199\,576\,970\,300$