

## MATH 1090 - SUMMER 2007 - ASSIGNMENT #6

### EXPONENTIAL AND LOGARITHMIC FUNCTIONS

- (1) Evaluate the functions  $f(x) = 2^x$  and  $g(x) = (\frac{1}{2})^x$  at the points

$$x = -4, -3, -2, -1, 0, 1, 2, 3, 4$$

and draw their graphs. Warning: the graphs of  $g$  and  $f$  are very different.

- (2) Without using a calculator, just the rules for exponents (page 177 in book) calculate the following:  $4^{\frac{3}{2}}$ ,  $0.125^{\frac{2}{3}}$ ,  $1.5^0$ ,  $3^{-1}$ .
- (3) Find the compounded amount and the interest in the following cases:
- (a) principal = \$1000, after one year, at APR=6% compounded annually.
  - (b) principal = \$1000, after 5 years, at APR=6% compounded annually.
  - (c) principal = \$1000, after one year, at APR=6% compounded quarterly.
  - (d) principal = \$1000, after 5 years, at at APR=6% compounded quarterly.
- (4) Without a calculator, using the rules for logarithms calculate:

$$\log_2(2), \log_2(1), \log_{1.44}(1), \log_2\left(\frac{1}{2}\right) \\ \log_{3.5}\left(\frac{1}{3.5}\right), \log_2\left(\frac{1}{4}\right), \log_2(32), \log_{10}(0.0001)$$

- (5) Using the rules for logarithms simplify the following expressions so that they contain only  $\log_2(3)$  and  $\log_2(5)$ :  $\log_2(\sqrt[4]{3})$ ,  $\log_2(15)$ ,  $\log_2(9)$ ,  $\log_2(\frac{1}{3})$ ,  $\log_2(\frac{5}{3})$ ,  $\log_3(5)$
- (6) Use the conversion formula to calculate the following expressions using the log button in your calculator:  $\log_{1.04}(1.87)$ ,  $\log_{1.1}(0.9)$ ,  $\log_3 7$ ,  $\log_{\frac{9}{2}}(\frac{3}{4})$
- (7) Simplify the following expressions, write them in terms of  $\log(x)$ ,  $\log(x+1)$ ,  $\log(x+2)$ :
- (a)  $\log\left[\left(\frac{x}{x+1}\right)^3\right]$
  - (b)  $\log\left[\frac{\sqrt{x}}{(x+1)^2(x+2)^3}\right]$
- (8) Do the opposite of what you did in 7 to combine these expressions into a single logarithm:
- (a)  $\log_5(x+3) - \log_5(x-15)$

(b)  $2 \log(x) - \frac{1}{2} \log(x - 2)$

(9) Solve these equations using logarithms:

(a)  $(27)^{2x+1} = \frac{1}{3}$

(b)  $5(3^x - 6) = 10$

(10) Use the compound interest formula to solve the following problems:

(a) Suppose a principal of \$1000 was invested at an annual rate of 10% compounded annually. How long will it take for the compounded amount to be \$2000?

(b) Same as 10a only with  $P = \$3000$  and  $S = \$6,000$

(c) Same as 10a only with  $P = \$500$  and  $S = \$1,000$

(d) Same as 10a only with principal  $P$  and compounded amount  $S = 2P$