

## MATH 170 – Sections 003 and 004 – Quiz 1

You may work with other class members on this quiz, but you may *not* receive assistance from people not in your MATH 170 section. You must show all of your work to receive full credit. Do all your work on other sheets of paper and be sure to staple all the pieces of paper together or **YOU WILL GET A 'ZERO' ON THE QUIZ**. Do not use decimal approximations unless asked to do so. Your work on this quiz must be handed in by the beginning of class on Friday, 27 January 2006. GOOD LUCK!

1) Let  $b > 0$  with  $b \neq 1$ . Given the usual laws of exponents and the fact that the equations

$$\log_b q = p$$

and

$$b^p = q$$

are equivalent, prove the following properties of logarithms:

- a)  $\log_b (b^x) = x$  for every real number  $x$
- b)  $b^{\log_b x} = x$  for all positive numbers  $x$
- c)  $\log_b (xy) = \log_b x + \log_b y$  for all positive numbers  $x$  and  $y$
- d)  $\log_b \left(\frac{x}{y}\right) = \log_b x - \log_b y$  for all positive numbers  $x$  and  $y$
- e)  $\log_b (x^r) = r \log_b x$  for all positive numbers  $x$  and all real numbers  $r$

2) Find the inverse of the function

$$f(x) = \sqrt{4-x}.$$

Then plot the graphs of  $y = f(x)$  and  $y = f^{-1}(x)$  on the same set of axes.

3) Use the technique of Section 2.1 of the textbook to estimate the slope of the line tangent to  $y = \sqrt{x}$  at  $x = 4$ .

4) Find all solutions to the equation:

$$\sin 2x = \sin x$$