## Quiz 5 - 7.2 and Chapter 8

## Solutions

December 4, 2006

Show all work for full credit. If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an algebraic method is available, you will not receive full credit.

1. Solve  $3\sin^2\theta = 5 - 5\cos\theta$ , for  $0 \le \theta \le \pi$ .

For a full solution, see example 2 on p. 303 in the textbook.

 $\theta = 0$  and 0.841 [4]

2. Check that the following functions are inverses of each other. [4]

$$f(x) = \sqrt{2x}, \quad g(x) = \frac{x^2}{2}, \text{ for } x \ge 0.$$

Solution.

$$f(g(x)) = f\left(\frac{x^2}{2}\right) = \sqrt{2\left(\frac{x^2}{2}\right)} = \sqrt{x^2} = |x| = x \text{ since } x \ge 0.$$
  
$$g(f(x)) = g\left(\sqrt{2x}\right) = \frac{\left(\sqrt{2x}\right)^2}{2} = \frac{2x}{2} = x$$

The following problem is from Test 1. It is the last problem which will be used to determine whether or not you have mastered the Test 1 material.

The Ironman Triathlon is a race that consists of three parts: a 2.4 mile swim followed by a 112 mile bike race and then a 26.2 mile marathon. A participant swims steadily at 2 mph, cycles steadily at 20 mph, and then runs steadily at 9 mph.

a) Assuming that no time is lost during the transition from one stage to the next, find a formula for the distance d, covered in miles, as a function of the elapsed time t in hours, from the beginning of the race. [3]

For a full solution, see example 3 on p. 72 in the textbook.

$$d = \begin{cases} 2t & \text{for } 0 \le t \le 1.2\\ 20t - 21.6 & \text{for } 1.2 < t \le 6.8\\ 9t + 53.2 & \text{for } 6.8 < t \le 9.71 \end{cases}$$

b) Sketch a graph of d for  $0 \le t \le 10$ . Be sure to label your scale and axes. [3]

See Figure 2.13 on p.73 of the text.