MATH 170 – Section 004 – Quiz 7

You may work with other class members on this quiz, but you may not receive assistance from people not in MATH 170 (Section 004). 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 Monday, 10 March 2003 at 11:40 a.m. GOOD LUCK!

1) Find all points on the graph of

\[ y = \cos 2x + 2 \sin x \]

at which the tangent line is horizontal.

2) Prove:

\[ \frac{d}{dx} (\arccos x) = \frac{-1}{\sqrt{1-x^2}} \]

3) Find all points on the curve

\[ x^2 + 4y^2 = 4 \]

where the slope of the tangent line is \( \frac{1}{2} \).

4) Find an equation of the line tangent to the graph of

\[ yx^2 + xy^2 + 4x = 0 \]

at the point \((4, -2)\).

5) At 2 p.m., ship A is 100 miles north of ship B. Ship A sails south at 10 miles per hour. Ship B sails east at 20 miles per hour. At what rate is the distance between the ships changing at 6 p.m.?

6) Water is being poured at the rate of 100 ft\(^3\)/min into a tank shaped like a cone. The tank has its vertex pointing downward and its circular base, which has a diameter of 8 ft, is parallel to the ground. The tank is 10 ft high. At what rate is the water level rising when the depth of water in the tank is 5 ft? Give the exact answer and an appropriate estimate. You may use the following formula for the volume of a cone:

\[ V = \frac{\pi r^2 h}{3} \]

where \( V \) = volume, \( r \) = radius of the base, and \( h \) = height.