MATH 170 – Section 004 – Quiz 8

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, 17 March 2003 at 11:40 a.m. GOOD LUCK!

1) A mass attached to a spring has position function

\[ y(t) = 3 \cos 4t, \]

where \( y \) is position (measured in centimeters) and \( t \) is time (measured in seconds).

   a) At what time(s) is the mass motionless?

   b) At what time(s) does the acceleration of the mass attain its maximum value?

2) Let

\[ f(x) = \ln(1 + 2x). \]

Find a formula for \( f^{(n)}(x) \), for \( n = 1, 2, 3, \ldots \)

3) Compute:

   a) \[ \frac{d}{dx} \left( \ln \left( e^{-5x} \sqrt{3x - 2 \cosh x} \right) \right) \]

   b) \[ \frac{d}{dx} \left( \frac{\cos^3 (6x - 1)}{\sin^4 (3x + 4)} \right) \]

4) Prove that

\[ \text{arctanh } x = \frac{1}{2} \ln \left( \frac{1 + x}{1 - x} \right) \]

5) Prove that

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