Math 173 - Quiz 7

March 12, 2015

Name_

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) In 1897 Thomson conducted a landmark experiment in modern physics when he measured the charge-to-mass ratio of an electron. The currently accepted value of the electron's charge is $1.602176487 \times 10^{-19}$ C with an error of $\pm 0.00000040 \times 10^{-19}$ C. The electron's mass is $9.10938215 \times 10^{-31}$ kg, with an error of $\pm 0.00000045 \times 10^{-31}$ kg. Compute the electron's charge-to-mass ratio and use differentials to approximate the error.

2. (3 points) Use differentials to approximate $\sin(1.05^2 + 0.95^2) - \sin(1^2 + 1^2)$.

3. (4 points) Use the definition of differentiability to show that $f(x, y) = 8x^2 - 4xy + y^3$ is differentiable on \mathbb{R}^2 .