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Name: _____

Worksheet 4 - Section 14.4, 14.5, 14. 6 (Due Tues, Oct 7)

Math 2110Q – Fall 2014

Professor Hohn

You must show all of your work to receive full credit!

1. If R is the total resistance of three resistors, connected in parallel, with resistances R_1 , R_2 , R_3 , then

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

If the resistances are measured in ohms as $R_1 = 25\Omega$, $R_2 = 40\Omega$, $R_3 = 50\Omega$, with a possible error of 0.5% in each case, estimate the maximum error in the calculated value of R .

2. If $z = f(x, y)$, where $x = r \cos \theta$, and $y = r \sin \theta$, find

(a) $\partial z / \partial r$

(b) $\partial z / \partial \theta$

(c) $\partial^2 z / \partial r \partial \theta$

3. Show that any function of the form

$$z = f(x + at) + g(x - at)$$

is a solution of the wave equation

$$\frac{\partial^2 z}{\partial t^2} = a^2 \frac{\partial^2 z}{\partial x^2}$$

[Hint: Let $u = x + at$ and $v = x - at$.]

4. Find the maximum rate of change of $f(x, y, z) = (x + y)/z$ at the point $(1, 1, -1)$ and the direction in which it occurs.