

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. A particle is moving along the curve $y = \sqrt{x}$. As the particle passes through the point $(4, 2)$, its x -coordinate increases at a rate of 3 cm/sec. How fast is the distance from the particle to the origin changing at this instant?

2. If two resistors with resistances R_1 and R_2 are connected in parallel, then the total resistance R of the resulting circuit (all measured in Ohms (Ω)), is given by

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

If R_1 and R_2 are increasing at rates $0.3\Omega/\text{sec}$ and $0.2\Omega/\text{sec}$, respectively, how fast is R changing when $R_1 = 80\Omega$ and $R_2 = 100\Omega$?

3. Use the linearization technique to estimate the number $(8.06)^{2/3}$.