Homework Set # 4

1. **(§2.4) Page 123:** # 1, 13, 17, 19, 20, 23.

2. **(§2.5) Page 132:** # 7, 10(a), 35.

3. If $g(x, y, z) = (x, \ x + y, \ x^2 + z, \ z)$ and $f(x, y, z, w) = (x^2 + z, \ y^2 - w)$, then $D(f \circ g)(1, 1, 1) = ?$

4. If $w = \sqrt{x^2 + y^2}$, with $\begin{cases} x = 3 + st \\ y = s^2 - 2t \end{cases}$, compute $\dfrac{\partial w}{\partial s}$ when $x = 3$ and $y = -4$.

5. If $w = f(x^2 - y^2, e^x)$, where $\dfrac{\partial f(u, v)}{\partial u} = \dfrac{1}{u}$ and $\dfrac{\partial f(u, v)}{\partial v} = \tan v$, express $\dfrac{\partial w}{\partial x}$ as a function of x and y.

6. The voltage V in a simple electric circuit is slowly decreasing as the battery wears out and the resistance R is slowly increasing as the resistor heats up. Given that $\dfrac{dV}{dt} = -0.01$ V/sec and $\dfrac{dR}{dt} = 0.03 \ \Omega$/sec, find the rate of change of the current I when $R = 400 \ \Omega$ and $V = 32$ volts.

Remark: **Ohm's Law**: $V = IR$