1.(1 pt) Suppose $w = \frac{x}{y} + \frac{y}{z}$, $x = e^{1t}$, $y = 2 + \sin(1t)$, $z = 2 + \cos(4t)$.

A. Use the chain rule to find $\frac{dw}{dt}$ as a function of x, y, z, and t. Do not rewrite x, y, and z in terms of t, and do not rewrite e^{1t} as x.

$\frac{dw}{dt} =$ _____

Note: Use exp() for the exponential function. Your answer should be an expression in x, y, z, and t; e.g. "3x - 4y"

B. Use part A to evaluate $\frac{dw}{dt}$ when $t = 0$.

2.(1 pt) Suppose $z = x^2 \sin y$, $x = -1s^2 - 2t^2$, $y = 2st$.

A. Use the chain rule to find $\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$ as functions of x, y, s and t.

$\frac{\partial z}{\partial s} =$ _____

$\frac{\partial z}{\partial t} =$ _____

B. Find the numerical values of $\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$ when $(s,t) = (-3,-3)$.

$\frac{\partial z}{\partial s}(-3,-3) =$ _____

$\frac{\partial z}{\partial t}(-3,-3) =$ _____

3.(1 pt) The radius of a right circular cone is increasing at a rate of 4 inches per second and its height is decreasing at a rate of 2 inches per second. At what rate is the volume of the cone changing when the radius is 30 inches and the height is 50 inches?

_____ cubic inches per second

4.(1 pt) In a simple electric circuit, Ohm's law states that $V = IR$, where V is the voltage in volts, I is the current in amperes, and R is the resistance in ohms. Assume that, as the battery wears out, the voltage decreases at 0.04 volts per second and, as the resistor heats up, the resistance is increasing at 0.03 ohms per second. When the resistance is 100 ohms and the current is 0.04 amperes, at what rate is the current changing?

_____ amperes per second