Answer the following problems. No calculators, formula sheets, or other aids are permitted. Please show all of your work. Each question is worth 5 points.

1. Compute the partial derivatives $\frac{\partial Q}{\partial x}$ and $\frac{\partial Q}{\partial z}$ of the following function:

$$Q(x, y, z) = \sin(x^2) + e^{2xyz}$$

$$\frac{\partial Q}{\partial x} = 2x\cos(x^2) + 2yze^{2xyz}$$

$$\frac{\partial Q}{\partial z} = 2xye^{2xyz}$$

2. Compute $\frac{dz}{ds}$ of the following function: $z(x, y) = x^2 + 2xy$, where $x = \cos(2s)$ and $y = e^3 s$.

$$\frac{dz}{ds} = \frac{dz}{dx} \cdot \frac{dx}{ds} + \frac{dz}{dy} \cdot \frac{dy}{ds}$$

$$\frac{dz}{ds} = (2x + 2y)(-2\sin(2s)) + 2x(e^3)$$

$$\frac{dz}{ds} = 2(\cos(2s) + e^3 s)(-2\sin(2s)) + 2\cos(2s)e^3$$

$$\frac{dz}{dx} = 2x + 2y$$

$$\frac{dz}{dy} = 2x$$

$$\frac{dx}{ds} = -2\sin(2s)$$

$$\frac{dy}{ds} = e^3$$