NAME:

Math 2401 (K1-K3)

Quiz 9
The Last Quiz!!!

1. (a). Find a potential function for the conservative field:

$$\mathbf{F}(x,y,z) = 18x^2\mathbf{i} + \frac{4z^2}{y}\mathbf{j} + 8z\ln(y)\mathbf{k}.$$

(b). Use part (a). to compute:

$$\int_{(6,1,1)}^{(6,5,3)} 18x^2\,dx + \frac{4z^2}{y}\,dy + 8z\ln(y)\,dz.$$

2. Recall Green's formulas:

$$\boxed{\oint_C \vec{F}\cdot\vec{n}\,ds = \oint_C M\,dy - N\,dx = \int\int_R \left(\frac{\partial M}{\partial x} + \frac{\partial N}{\partial y}\right)\,dA},$$

$$\boxed{\oint_C \vec{F}\cdot\vec{T}\,ds = \oint_C M\,dx + N\,dy = \int\int_R \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)\,dA}.$$

Use this to find:

$$\oint_C \left(2y + \sqrt{1+x^5}\right)\,dx + \left(5x - e^{y^2}\right)\,dy,$$

where C is a positively oriented rectangle in the plane, with sides of length 2 and 5.