Problem 1

Find the potential function for the field $\mathbf{F} = e^x \ln(y)\mathbf{i} + \left(\frac{e^x}{y} + \sin(z)\right)\mathbf{j} + y\cos(z)\mathbf{k}$.

Problem 2

Find the potential function for the field $\mathbf{F} = e^{y+2z}(\mathbf{i} + x\mathbf{j} + 2x\mathbf{k})$.

Problem 3

Show that $F = y + z\mathbf{i} + x + e^y(1+y)\mathbf{j} + x\mathbf{k}$ is conservative, find it's potential function, f, and use it to compute $\int_C F \cdot dr$ for a curve, C, that starts at $(1, 0, 2)$ and ends at $(2, 2, 1)$.

Problem 4

Let C be any curve from $(0, 2, 1)$ to $(1, \frac{\pi}{2}, 2)$ (assume that the curve stays in a domain that satisfies the appropriate conditions, of course). Evaluate $\int_C 2\cos(y)\ dx + \left(\frac{1}{y} - 2x\sin(y)\right)\ dy + \frac{1}{z}\ dz$ by showing that the associated field is conservative and finding a potential function.