FALL 24 - CALCULUS 3 - EXAM 5

All problems equal points. Takehome due midnight Tuesday Dec 10th. Return all work to me as a single pdf to tbeatty@fgcu.edu. All honorable references permitted.

1) Evaluate $\int_C yds$ along the curve C given by $y = 2\sqrt{x}$ from $x = 3$ to $x = 24$.

2) Given the force field $\mathbf{F} = \langle 3x - 4y + 2z, 4x + 2y - 3z^2, 2xz - 4y^2 + z^3 \rangle$, find the work done in moving a particle once counterclockwise around the ellipse given by $\mathbf{r}(t) = 4\cos t\,\hat{\mathbf{i}} + 3\sin t\,\hat{\mathbf{j}}$.

3) Find the curl of the vector field given by $\mathbf{A}(x, y, z) = \langle 3x^2 - 6yz, 2y + 3xz, 1 - 4xyz^2 \rangle$. Is this field conservative?

4) A thin wire is bent to take the shape of the curve $z = 4 - y^2$ for $z \geq 0$. The linear mass density of the wire is $1 + z$. What are the coordinates of its center-of-mass?