MTH 265, Quiz #6, Summer 2021 Name _____

Instructions: Show all work. Use exact answers unless specifically asked to round. Be sure to complete all parts of each question.

1. Find the volume of the solid bounded by $f(x,y) = -x^2 - y^2, +9, z = 0$. Set the integral up in rectangular and polar coordinates. Integrate the polar version.

2. Find the volume of the solid bounded above by the sphere of radius 9 centered at the origin, and below by the cone $z = \sqrt{x^2 + y^2}$. [Hint: it will be easier to integrate in spherical coordinates.]

3. Find the potential function, if it exists, for the vector field $F(x,y,z) = (3x^2y - z)\hat{\imath} + (yz + x^3)\hat{\jmath} + (\frac{1}{2}y^2 - x)\hat{k}$. If it does not exist, verify this by applying the test for conservative vector fields.