5. Let V be the volume of the solid cone whose base is the unit disk in the xy-plane and whose tip is at the point $(0, 0, 2)$ in the xyz-space.

a. Only two of ❶-❸ will be graded. Mark the ones you want to be graded by putting a ✓ in the corresponding ☐ s.

❶ ☐ Express V in terms of iterated integrals in Cartesian coordinates by filling in the rectangles.

$$V = \int_{\square}^{\square} \int_{\square}^{\square} \int_{\square}^{\square} dz\, dy\, dx$$

❷ ☑ Express V in terms of iterated integrals in cylindrical coordinates by filling in the rectangles.

$$V = \int_{\boxed{0}}^{\boxed{2\pi}} \int_{\boxed{0}}^{\boxed{1}} \int_{\boxed{0}}^{\boxed{2-2r}} r\, dz\, dr\, d\theta$$

❸ ☑ Express V in terms of iterated integrals in spherical coordinates by filling in the rectangles.

$$V = \int_{\boxed{0}}^{\boxed{2\pi}} \int_{\boxed{0}}^{\boxed{\pi/2}} \int_{\boxed{0}}^{\boxed{2/(\cos\phi + 2\sin\phi)}} \rho^2 \sin\phi\, d\rho\, d\phi\, d\theta$$

b. Compute V using its expression in terms of iterated integrals in one of the coordinate systems in **Part a.**

$$V = \int_0^{2\pi} \int_0^1 r\, [z]_{z=0}^{r=2-2r}\, dr\, d\theta$$

$$= \int_0^{2\pi} \int_0^1 (2r - 2r^2)\, dr\, d\theta$$

$$= \int_0^{2\pi} \left[r^2 - \frac{2}{3} r^3 \right]_{r=0}^{r=1} d\theta = \frac{2\pi}{3}$$