Names: _____

1. Find the volume of the ellipsoid $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} \le 1$ where a, b, c are constants (it is a squished sphere).

2. Find the line integral $\displaystyle\int_C (x - y)\, ds$ where C is the line segment from (a, b, c) to (d, e, f).

3. Using a line integral, find the lateral surface area of the portion of the cylinder $x^2 + y^2 = r^2$ above the plane $z = 0$ and below the graph of $z = f(x,y)$. (Leave the answer as an integral involving f).

4. Let R be the set of points in the x,y-plane which satisfy $x^2 + y^2 \leq a^2$. Use Question the previous exercise to explain why

$$\iint_R f(x,y)\,dx\,dy = \int_0^a \int_0^{2\pi} f(r\cos\vartheta, r\sin\vartheta)\,r\,d\vartheta\,dr$$