First & Last Name: _____ Student ID: _____

Math 2310 Multivariable Calculus III April 2 Exam 2 Review Activity
(Please do at home — you don't need to turn in this activity.)

1. Reverse the order of integration of $\int_0^4 \int_{\sqrt{y}}^2 3e^{(x^3)}\,dx\,dy$, then evaluate the integral.

2. Consider the region R in the second quadrant, bound the line $y = -x$, the x-axis, and curve $y = \sqrt{25 - x^2}$. (This is a "wedge" contained in the second quadrant.) Write R in set-builder notation using polar coordinates:

$$R = \{(r, \theta) : \_\_\_\_ \leq r \leq \_\_\_\_ \text{ and } \_\_\_\_ \leq \theta \leq \_\_\_\_\}$$

3. Convert the following double integral from Cartesian to polar coordinates. Then evaluate the integral:

$$\int_{-3}^{3}\int_{0}^{\sqrt{9-x^2}} \sin(\pi x^2 + \pi y^2)\, dy\, dx$$

4. Consider the solid D bound by the sphere $x^2 + y^2 + z^2 = 20$ and the paraboloid $z = x^2 + y^2$ in the first octant. Set up a triple integral in cylindrical coordinates to compute the volume of this solid. (Do not evaluate the integral.)

Answers:

1. Iterated integral in reverse order: $\int_0^2 \int_0^{x^2} e^{(x^3)}\ dy\ dx$

   2nd answer: $e^8 - 1$

2. $R = \{(r, \theta) : 0 \le r \le 5 \text{ and } \frac{3\pi}{4} \le \theta \le \pi\}$

3. 1

4. $\int_0^{\pi/2} \int_0^2 \int_{r^2}^{\sqrt{20-r^2}} r\, dz\, dr\, d\theta$