Math 20C  Homework 7  Due December 6, 2019

Note: The score you earn will be based on the correctness of your solutions. A “right answer” will earn no credit without a correct solution to support it.

1. (6 points) Evaluate the double integral \( \int\int_D xy \, dA \), where the region \( D \) is the triangular region whose vertices are \((0,0), (0,2), (2,0)\).

2. (6 points) Evaluate \( \int\int_D y \, dA \), where \( D \) is the set of points \((x, y)\) such that \(0 \leq \frac{2\pi}{\pi} \leq y\), and \(y \leq \sin(x)\).

3. (6 points) Change the order of integration and evaluate: \( \int_{y=0}^{1} \int_{x=\sqrt{y}}^{1} e^{x^3} \, dx \, dy \).

4. (6 points) If \( D = [-1, 1] \times [-1, 2] \), show that \( 1 \leq \int\int_D \frac{dx \, dy}{x^2 + y^2 + 1} \leq 6 \).

5. (6 points) Perform the indicated integration over the given box: \( \int\int\int_B x^2 \, dx \, dy \, dz \), \( B = [0, 1] \times [0, 1] \times [0, 1] \).

6. (6 points) Find the volume of the solid region bounded by \( x = y \), \( z = 0 \), \( y = 0 \), \( x = 1 \), and \( x+y+z = 0 \).

7. (6 points) Let \( D \) be the unit disk \( x^2 + y^2 \leq 1 \). Evaluate \( \int\int_D \exp(x^2 + y^2) \, dx \, dy \) by making a change of variables to polar coordinates.

8. (6 points) Integrate \( z e^{x^2+y^2} \) over the cylinder \( x^2 + y^2 \leq 4 \), \( 2 \leq z \leq 3 \).