

1. A contour map is shown for a function f on the square $R = [0, 3] \times [0, 3]$. Use a Riemann sum with nine terms to estimate the value of $\iint_R f(x, y) dA$. Take the sample points to be the upper right corners of the squares. You may leave your answer as a sum; **you do not need to carry out arithmetic.**

12 pts

2. Calculate the triple integral $\iiint_E dV$, where $E = \left\{ (x, y, z) \mid 0 \leq x \leq 1, -3 \leq y \leq 3, 0 \leq z \leq \frac{xy^2}{x^2 + 1} \right\}$.

13 pts

(OVER)

3. Set up **but do not evaluate** an iterated integral for the volume of the solid under the plane $z = 4x + 3y$ and above the right half of a disk, where the disk is centered at $(0, 4)$ with radius 2.

12 pts

4. Evaluate $\iint_D e^{(x^2+y^2)} dA$, where D is a disk with center $(0, 0)$ and radius $1/2$.

13 pts

5. Set up **but do not evaluate** an integral for the moment about the y -axis of the lamina that occupies the region bounded by $y = e^x$, $y = 0$, $x = 0$, and $x = 1$ and has the density function $\rho = y$.

12 pts

6. Set up **but do not evaluate** an integral for the AREA of the part of the SURFACE $z = 1 + x^{3/2} + 2y$ that lies above the triangle with vertices $(0, 0)$, $(1, 0)$, and $(0, 2)$.

13 pts

(OVER)

7. Rewrite the integral $\int_{-1}^1 \int_{x^2}^1 \int_0^{1-y} f(x, y, z) dz dy dx$ as an iterated integral in the order $dx dy dz$.

13 pts

8. Evaluate the double integral $\int_0^{2\pi} \int_1^2 10 r dr d\theta$ by identifying it as the volume of a solid. **USE GEOMETRY. DO NOT DO ANY INTEGRATION.** Sketch the solid.

12 pts