

NAME & S.S.N.:

SCORE:

1. Consider a rectangular sheet bounded by $x = 0$, $x = 2$, $y = 0$, and $y = 1$. The density at any point (x, y) on the sheet is $\delta(x, y) = x + y + 1$.

a. (10 points) Approximate the weight of the sheet by cutting it into eight squares of equal size (i.e., via one horizontal cut and three vertical cuts) and using the density at the center for each square.

b. (10 points) Compute the exact weight.

2. (15 points) Evaluate $\int_0^1 \int_y^1 e^{x^2} dx dy$.

3. (15 points) Compute $\iint_R \sin(x^2 + y^2) dA$, where the region R in the xy -plane is bounded by $x^2 + y^2 = 3$.

4. (10 points) Use explicit integrals to express the coordinates of the centroid of the region R in the second quadrant of the xy -plane and bounded by the curves $x = 0$, $y = 0$, and $x + 1 = y^2$. (Do NOT evaluate any of your integrals.)

5. (15 points) Use the substitution $x = 2u + v$, $y = u + 2v$ to evaluate the integral $\iint_R (x - 2y)dA$, where R is the parallelogram region in the xy -plane bounded by the lines $x + 3 = 2y$, $x = 2y$, $2x = y$, and $2x = y + 3$.

6. (25 points) Give the six iterated integrals, with explicit limits for each integration, for computing the integral $\iiint_B f(x, y, z) dV$, where the solid body B in the first octant is bounded by the surfaces $x = 0$, $x^2 = y$, $3y + 2z = 6$, and $z = 0$. (Do NOT evaluate)