

100 Points

Show ALL your work. Please circle your final answers.

1. EVALUATE $\int_0^1 \int_x^1 \sin(y^2) \, dy \, dx$.

15 Points

2. EVALUATE $\int_1^2 \int_y^{y^3} e^{x/y} \, dx \, dy$.

10 Points

25 Points

3. Set up a double integral in polar coordinates and evaluate it to find the area of the region in the first quadrant that lies between the circles $x^2 + y^2 = 4$ and $x^2 + y^2 = 2x$.

15 Points

4. Given $\int_0^1 \int_{y^2}^{2-y} f(x, y) dx dy$, set up an equivalent double integral(s) with the order of integration reversed. DO NOT EVALUATE THE INTEGRAL(S).

15 Points

5. Set up a triple integral(s) to find the volume of the solid bounded by the paraboloid $x = 4y^2 + 4z^2$ and the plane $x = 4$. DO NOT EVALUATE THE INTEGRAL(S).

12 Points

6. Use triple integrals to find the *z*-coord. of the center of mass for the ~~radius of gyration about the z-axis~~ solid bounded by $x = 0$, $y = 0$, $z = 0$, $y = 1 - x$, and $z = 1 - x^2$. The density of the region is given by $\delta(x, y, z) = 1 + x$. Set up all of your integrals so that the order of integration is $dy dz dx$. DO NOT EVALUATE THE INTEGRALS.

18 Points

30 points

7. Use the technique of Lagrange Multipliers to find the point on the plane $2x - y + z = 3$ that is closest to the point $(-4, 1, 3)$.

15 Points