

Exam 4

Show your work. Justify your conclusions.

- [10] 1. Let R be the region enclosed by the curves $y = 4 - x^2$ and $y = 3x$. Find the volume of the region bounded below by R and above by the plane $z = x + 4$.
2. Let $f(x, y)$ be a continuous function, and R the region bounded by the curves $y = x^2$ and $y = x + 2$.
- [8] a. Write the double integral of f over R as an iterated integral (or sum of iterated integrals) with order of integration $dx dy$.
- [4] b. Write the double integral of f over R as an iterated integral (or sum of iterated integrals) with order of integration $dy dx$.
- [6] 3. Change the Cartesian integral $\int_0^6 \int_0^y x dx dy$ into an equivalent polar integral. Then evaluate the integral.
4. Let D be the region enclosed by the paraboloids $z = x^2 + y^2$ and $z = 8 - x^2 - y^2$.
- [6] a. Write out the triple iterated integral for the volume of D with order of integration $dz dy dx$.
- [4] b. Change the order of integration to $dx dy dz$.
- [6] 5. Let D be as in the previous problem. Set up *but do not evaluate* the integral of $f(x, y, z) = x^2 + y^2 - z$ over D in cylindrical coordinates.
- [6] 6. Let D be the region bounded by the surfaces $x^2 + y^2 + z^2 = 4$, $z = 0$ and $z = 1$. Set up *but do not evaluate* an integral for the volume of D in spherical coordinates.