Name:__________________________

§13.1 Double Integrals Over Rectangular and General Regions

1. Evaluate the double integral $\iint_R 4xe^{2y}\, dA$, where $R = \{(x, y)\,|\, 2 \leq x \leq 4,\ 0 \leq y \leq 1\}$.

2. Sketch the solid whose volume is given by the iterated integral $\iint_R \left(4 - x^2 - y^2\right)\, dy\, dx$, where $R = \{(x, y)\,|\, -1 \leq x \leq 1,\ -1 \leq y \leq 1\}$.

3. Evaluate the iterated integral $\iint_R \frac{3}{4+y}\, dx\, dy$, where R is the region bounded by the functions $x = 0$, $x = y^2$, $y = 0$, and $y = 1$.

4. Find and evaluate an integral equal to the volume of the solid bounded by the given surfaces: $z = 3x^2 + 2y$, $z = 0$, $y = 0$, $y = 1$, $x = 1$, and $x = 3$.

5. Change the order of integration: $\iint_R f(x, y)\, dx\, dy$, where R is the region bounded by $x = 0$, $x = \ln(y)$, $y = 1$, and $y = 2$.

6. Evaluate the iterated integral by first changing the order of integration: $\iint_R \cos\left(x^3\right)\, dx\, dy$, where R is the region bounded by $x = \sqrt{y}$, $x = 1$, $y = 0$, $y = 1$.

7. Use a double integral to compute the area bounded by the curves $y = x^3$ and $y = x^2$.

8. Compute the volume of the solid bounded by the surfaces $z = x^2 + y^2$, $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$.

9. Compute the average value of $f(x,y) = y^2$ on the region bounded by $y = x^2$ and $y = 4$.

10. Let T be the tetrahedron with vertices $(0,0,0)$, $(a,0,0)$, $(0,b,0)$, and $(0,0,c)$. Let B be a rectangular box with the same vertices plus $(a,b,0)$, $(a,0,c)$, $(0,b,c)$, and (a,b,c). Use integration to find the voume of T (which is one-sixth the volume of B).