

Name: _____

Score: _____ /15

WORKSHEET 7 - CHAPTER 15 (DUE TUES, APR 14)

Math 2110Q – Spring 2015
Professor Hohn

You must show all of your work to receive full credit!

Answer (in no particular order):

$$176, \frac{8}{15}, e - 2, \frac{1}{4}, -\ln(2), \frac{1}{3}(2^{3/2} - 1), \frac{\pi}{6}, \frac{13}{24}, \frac{64\pi}{9}, 16, \frac{1}{4}(e - 1), 12\pi, 0, \pi/12, 9\pi(\sqrt{2} - 1)$$

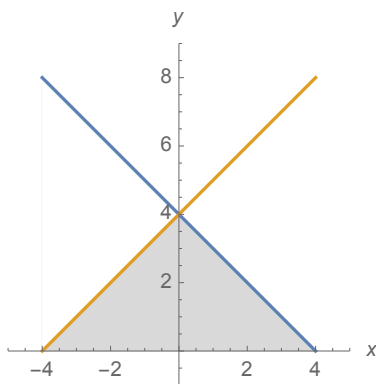
1. Calculate the integral

$$\int_0^1 \int_0^1 ye^{xy} dx dy.$$

2. Calculate the integral

$$\int_0^1 \int_0^y \int_x^1 6xyz \, dz \, dx \, dy.$$

3. Write $\iint_R f(x, y) dA$ as an iterated integral where R is the region described below.



Check your answer by letting $f(x, y) = 1$.

4. Convert the following into an integral in cylindrical coordinates.

$$\int_{-1}^1 \int_0^{\sqrt{1-y^2}} \int_{x^2+y^2}^{\sqrt{x^2+y^2}} xyz \, dz \, dx \, dy$$

(Check your answer by integrating and using the function $f(x, y, z) = 1$ instead of the function $f(x, y, z) = xyz$)

5. Convert the following into an integral in spherical coordinates.

$$\int_0^3 \int_0^{\sqrt{9-y^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{18-x^2-y^2}} (x^2 + y^2 + z^2) dz dx dy$$

(Check your answer by integrating and using the function $f(x, y, z) = 1$ instead of $f(x, y, z) = x^2 + y^2 + z^2$)

6. Set up an integral

$$\iint_D x \, dA$$

where D is the region in the first quadrant that lies between $x^2 + y^2 = 1$ and $x^2 + y^2 = 2$.

7. Set up an integral

$$\iiint_E z \, dV$$

where E is the region bounded by $y = 0$, $z = 0$, $x + y = 2$ and $y^2 + z^2 = 1$ in the first octant.

8. Set up an integral to find the volume of the solid bounded by $x^2 + y^2 = 4$, $z = 0$, and $y + z = 3$.

9. Set up an integral to find the volume of the solid under the paraboloid $z = x^2 + 4y^2$ and above the rectangle $R = [0, 2] \times [1, 4]$.

10. Set up an integral to find the volume of the solid above the paraboloid $z = x^2 + y^2$ and below the half cone $z = \sqrt{x^2 + y^2}$.

11. Convert the following integral into an integral with spherical coordinates.

$$\int_{-2}^2 \int_0^{\sqrt{4-y^2}} \int_{-\sqrt{4-x^2-y^2}}^{\sqrt{4-x^2-y^2}} y^2 \sqrt{x^2 + y^2 + z^2} dz dx dy$$

12. 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 $dx dy dz$. Check your answer by integrating using the function $f(x, y, z) = 1$.

13. Calculate the integral below by first reversing the order of integration.

$$\int_0^1 \int_{\sqrt{y}}^1 \frac{ye^{x^2}}{x^3} dx dy$$

14. Bonus: Use the transformation $u = x - y$, $v = x + y$ to evaluate

$$\iint_R \frac{x - y}{x + y} dA$$

where R is the square with vertices $(0, 2)$, $(1, 1)$, $(2, 2)$, and $(1, 3)$.