MATH 2130 Tutorial 12

1. Find the area bounded by $(x^2+y^2)^3 = 4a^2x^2y^2$.

2. Find the double integral of $f(x,y) = xy(x+y)$ over the region in the first quadrant bounded by $x^2+y^2=1$ and $x^2+y^2=4$.

3. Evaluate the triple integral of the function $f(x,y,z) = x$ over the volume bounded by the surfaces

$$2x+3y+z=6, \quad x=0, \quad y=0, \quad z=0.$$

4. Find the volume in the first octant bounded by the surfaces

$$4x+4y+z=16, \quad z=0, \quad y=x/2, \quad y=2x.$$

5. Set up, but do **NOT** evaluate, a triple iterated integral for the volume in the first octant bounded by the surfaces

$$z=2x+y, \quad 9x^2+4y^2=1, \quad x=0, \quad y=0, \quad z=0.$$

6. Set up, but do **NOT** evaluate, a triple iterated integral for the volume bounded by the surfaces

$$z=9-x^2-y^2, \quad z=x^2.$$

7. Find the volume bounded by the surfaces

$$z=xy, \quad x^2+y^2=1, \quad z=0.$$

8. Find the volume bounded by the surfaces

$$z=2\sqrt{x^2+y^2} \quad \text{and} \quad z=9-x^2-y^2.$$

Get a numerical answer, but do not simplify it.

9. Set up, but do **NOT** evaluate, a triple iterated integral for the triple integral of the function $f(x,y,z)=x^2+y^3$ over the volume bounded by the surfaces

$$(x^2+y^2)^2=2xy, \quad z=\sqrt{1-x^2-y^2}, \quad z=0.$$

Answers

1. $\pi a^2/2$ **2.** $62/15$ **3.** $9/2$ **4.** $128/9$

5. $\displaystyle\int_0^{1/3}\int_0^{(1/2)\sqrt{1-9x^2}}\int_0^{2x+y} dz\,dy\,dx$

6. $\displaystyle 4\int_0^{3/\sqrt{2}}\int_0^{\sqrt{9-2x^2}}\int_{x^2}^{9-x^2-y^2} dz\,dy\,dx$

7. $1/2$ **8.** $\displaystyle 2\pi\left[\frac{9(\sqrt{10}-1)^2}{2}-\frac{(\sqrt{10}-1)^4}{4}-\frac{2(\sqrt{10}-1)^3}{3}\right]$

9. $\displaystyle 2\int_0^{\pi/2}\int_0^{\sqrt{\sin 2\theta}}\int_0^{\sqrt{1-r^2}} r^3\cos^2\theta\,dz\,dr\,d\theta$