Math 233 - November 23, 2009

- Triple integrals

1. Use a triple integral to find the volume of the region. Make sure you sketch the region. R is the tetrahedron with vertices $(0,0,0)$, $(3,2,0)$, $(0,3,0)$, $(0,0,2)$.

2. Find the average value of $f(x,y,z) = x+2y-z$ on the tetrahedron with vertices $(0,0,0)$, $(3,2,0)$, $(0,3,0)$, $(0,0,2)$.

3. Use a triple integral to find the volume of the region. Make sure you sketch the region. R is the region bounded by the cylinder $x^2+y^2-2y=0$ and the planes $x-y=0$, $z=1$ and $z=3$.

4. Use a triple integral to find the volume of the region. Make sure you sketch the region. R is solid region in the first octant bounded by $y=2x^2$ and $y+4z=8$.

5. Find the average value of the function $f(x,y,z) = xy$ on the solid region in the first octant bounded by $y=2x^2$ and $y+4z=8$.

6. Use a triple integral to find the volume of the region. Make sure you sketch the region. R is the region bounded by $x^2=y$, $z^2=y$ and $y=1$.

7. Use a triple integral to find the volume of the region. Make sure you sketch the region. R is region boundec between $z=9-x^2-y^2$ and $z=3x^2+3y^2-16$.

8. Change the integral to an integral in the order $dz\ dy\ dx$.

$$\int_0^1 \int_0^{\sqrt{1-y^2}} \int_0^{\sqrt{1-y^2-z^2}} f(x,y,z)\ dx\ dz\ dy =$$

9. Change the integral to an integral in the order $dz\ dy\ dx$.

$$\int_0^2 \int_0^{4-2y} \int_0^{4-2y-z} f(x,y,z)\ dx\ dz\ dy =$$

10. Change the integral to an integral in the order $dy\ dx\ dz$.

$$\int_0^2 \int_0^{9-x^2} \int_0^{2-x} f(x,y,z)\ dz\ dy\ dx =$$

11. Let R be the solid in the first octant cut off from the square cylinder with sides $x=0$, $x=1$, $z=0$ and $z=1$, cut by the plane $2x+y+2z=6$. Do this in two ways

    (a) Integrating $dz\ dy\ dx$.

    (b) Integrating $dy\ dx\ dz$.