Chapter 16 - Multiple Integrals

1) $\int_0^{\pi/2}\int_0^{\pi/2} \cos x \sin y \, dy\,dx$

2) $\int_0^{1}\int_0^{1} e^{2x+y} \, dx\,dy$

3) $\int_0^{1}\int_{\sqrt[3]{x}}^{1} e^{y/x} \, dx\,dy$

4) $\iint_D x \, dA$

D is bounded by $y = x^2 - 1$, $y = \frac{1}{1+x^2}$

5) Find the volume of the solid bounded below by the xy-plane and above by the paraboloid $z = 25 - x^2 - y^2$

6) $$\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{1}{\sqrt{4-x^2-y^2}}\, dy\, dx$$

7) Find the area of the region in the plane $z = 1 + 2x + 2y$ that lies above the region in the xy plane bounded by $y = x^2$ and $x = y^2$

8) Find the area of the surface $z = x^3 + y^3 + 7$ that lies inside the cylinder $x^2 + y^2 = 100$

9) Find the volume of the elliptic cone bounded by $z = \sqrt{x^2 + 4y^2}$ and the plane $z = 1$.

Evaluate:

10) $$\iiint_R (x + y + z)\, dV \qquad R = \{(x, y, z) \mid 0 \le x \le 1,\ -1 \le y \le 1,\ 0 \le z \le x + 2\}$$

Switch the order of integration to $dy\,dx\,dz$ and $dx\,dy\,dz$

11) $$V = \int_{-1}^{1}\int_{y^2}^{1}\int_{0}^{1-x} dz\,dx\,dy$$

Remember there are 4 basic integration techniques:

1) u substitution

2) Integration by parts

3) Switching the order of integration

4) using Polar coordinates.

Also, on the exam SHOW YOUR WORK!

Partial credit will be awarded but you can only get credit for what you write out.

Supplemental Section

12) Find the center of mass of the lamina cutout by $y = x^2$ and $y = 2x + 3$ with density $\delta(x, y) = x + y$

13) Using the mid point rule for triple integrals, Comute the Reimann Sum used to estimate

$$\iiint_E \sqrt[3]{x^2 + y^2 + 3z^2}\, dV$$

Where E is a cube defined by $1 \le x \le 2$, $1 \le y \le 2$, $0 \le z \le 1$ and we divide E into 8 equal regions.