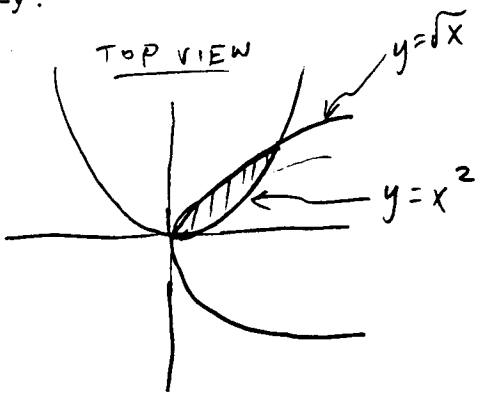
Calculus IV Quiz 4 Summer 2000 6/29/2000

1. *Set up* a double integral (you need not work it out) for the volume of the solid under the paraboloid $z=x^2+y^2$ and above the region bounded by $y=x^2$ and $x=y^2$.

Integral :

$$\int_0^1 \int_{x^2}^{\sqrt{x}} (x^2+y^2)\,dy\,dx$$

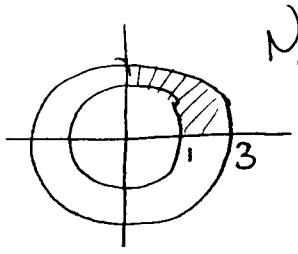
5



5

2. *Set up* a double integral *and use it to find the volume* of the solid under the cone $z=\sqrt{x^2+y^2}$ above the ring $1 \le x^2+y^2 \le 9$.

$z=\sqrt{r^2}$



Nice

$$\int_0^{2\pi}\int_1^3 \sqrt{r^2}\, r\, dr\, d\theta = \int_0^{2\pi}\int_1^3 r^2\, dr\, d\theta =$$

$$\int_0^{2\pi} \frac{r^3}{3}\Big|_1^3 d\theta = \int_0^{2\pi} \left(\frac{3^3}{3}-\frac{1}{3}\right) d\theta = \int_0^{2\pi} \left(\frac{27}{3}-\frac{1}{3}\right) d\theta$$

$$\int_0^{2\pi} \frac{26}{3}\, d\theta = \frac{26}{3}(\theta)\Big|_0^{2\pi} = \frac{26}{3}(2\pi) = \frac{52\pi}{3}$$