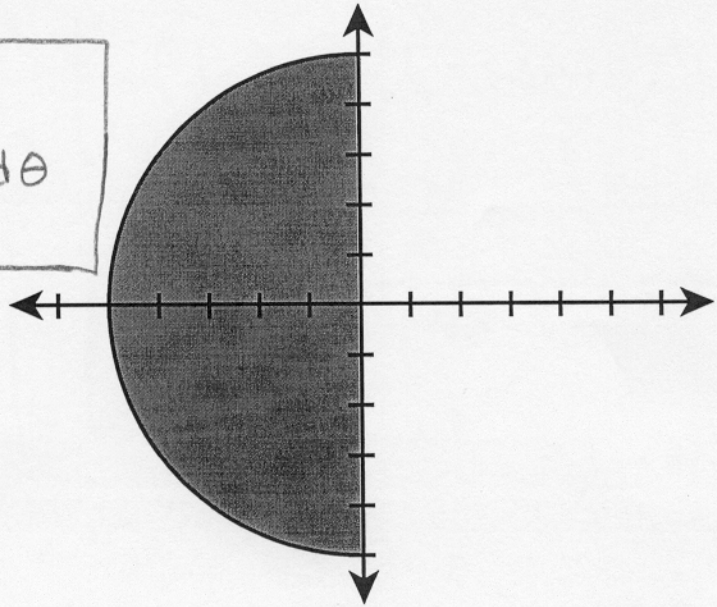
Quiz 3 Calculus 3 10/19/2005

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Set up limits of integration in polar coordinates for the integral of a function f on the region R shown below:

$$\int_{\theta=\pi/2}^{\theta=\frac{3\pi}{2}} \int_{r=0}^{r=5} f(r\cos\theta, r\sin\theta)\, r\, dr\, d\theta$$

Beautiful



$0 \le r \le 5$

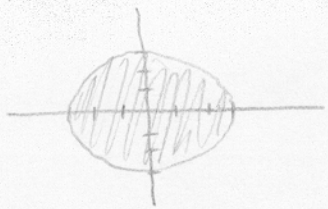
$\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$

2. Set up an integral in polar coordinates for the volume of the region between $z = 9 - x^2 - y^2$ and the xy-plane.

Top view:

$0 = 9 - x^2 - y^2$

$x^2 + y^2 = 9$



$\iint_R f\, dA$

$\int_0^{2\pi} \int_0^3 (9 - x^2 - y^2) r\, dr\, d\theta$

since $x^2 + y^2 = r^2$,
$-x^2 - y^2 = -r^2$

$\int_0^{2\pi} \int_0^3 (9 - r^2) r\, dr\, d\theta$

Excellent