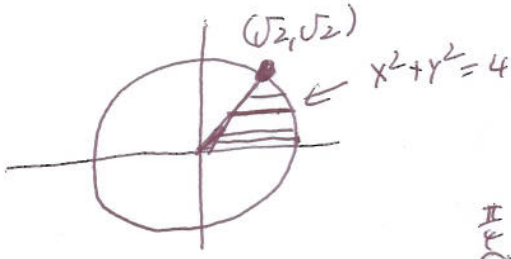
Quiz for April 11, 2008

Compute

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

I'll do it in Polar coordinates.



This integral is equal to $\int_0^{\frac{\pi}{4}} \int_0^2 \frac{r}{\sqrt{1+r^2}} dr\, d\theta$

$= \frac{\pi}{4} \left[\sqrt{1+r^2}\right]_0^2 = \boxed{\frac{\pi}{4}\left(\sqrt{5}-1\right)}$