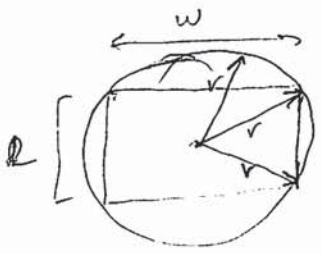
CIRCLE DISCRETIZATION



Area of circle $= \pi r^2$

Area of Rectangle $= lw$

E = Error $= \pi r^2 - lw$

$= \pi r^2 - 2l\sqrt{r^2 - l^2/4}$

$\left(\frac{l}{2}\right)^2 + \left(\frac{w}{2}\right)^2 = r^2$

$\sqrt{\left(r^2 - \frac{l^2}{4}\right)4} = w$

$w = 2\sqrt{r^2 - l^2/4}$

$$\frac{dE}{dl} = -2\sqrt{r^2 - l^2/4} - \cancel{2}\, l \frac{1}{\cancel{2}\sqrt{r^2 - l^2/4}}\left(\frac{-2l}{4}\right)$$

$$= \frac{l^2/2}{\sqrt{r^2 - l^2/4}} - 2\sqrt{r^2 - l^2/4} = 0$$

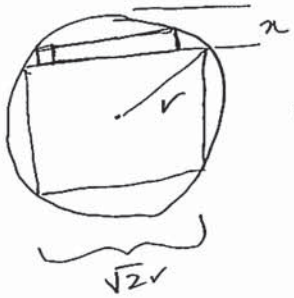
$$= \frac{l^2/2 - 2r^2 + 2l^2/4}{\sqrt{r^2 - l^2/4}} = 0$$

$\Rightarrow \quad l^2 = 2r^2$

$l = \sqrt{2}\, r \Rightarrow w = 2\sqrt{r^2 - \frac{2r^2}{4}}$

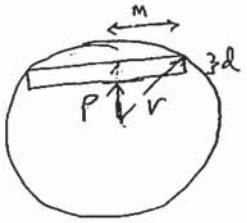
$= 2\sqrt{\frac{r^2}{2}} = \sqrt{2}\, r$

$\boxed{\Rightarrow l = w = \sqrt{2}r}$



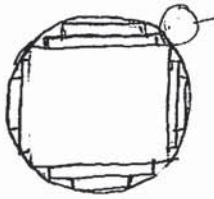
$x = r - \frac{\sqrt{2}\, r}{2} = r\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$ → Divide this into n segments

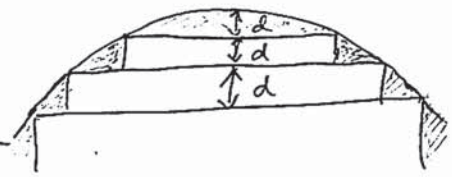
Size of segment



$m = \sqrt{r^2 - (p+d)^2}$

CIRCLE DISCRETIZE FUNCTION





SHADED AREA = Error from True circle area.