Quiz 12

Find the eqn. of the line tangent to $r=f(\theta)$ at $\theta=\pi$.

$r=\frac{1}{\theta}$

$\frac{dr}{d\theta}=\frac{-1}{\theta^2}$

$$\frac{dy}{dx}=\frac{\frac{-1}{\theta^2}\sin\theta+\frac{1}{\theta}\cos\theta}{\frac{-1}{\theta^2}\cos\theta-\frac{1}{\theta}\sin\theta}$$

Plug in $\theta=\pi$ into $\frac{dy}{dx}$ to get $\frac{0-\frac{1}{\pi}}{\frac{1}{\pi^2}-0}=\frac{-1}{\pi}\cdot\frac{\pi^2}{1}=\underbrace{-\pi}_{m}$

Convert $(r,\theta)=\left(\frac{1}{\pi},\pi\right)$ into rectangular form to get:

$x_1=r\cos\theta=\frac{1}{\pi}\cos\pi=\frac{-1}{\pi}$

$y_1=r\sin\theta=\frac{1}{\pi}\sin\pi=0$

Next use $y-y_1=m(x-x_1)$

$y-0=-\pi\left(x+\frac{1}{\pi}\right)$

$\boxed{y=-\pi x-1}$