

p 153

$$(56) \quad a) \frac{2}{3} \quad b) 2\pi + 5 \quad c) 15 - 8\pi$$

$$d) \frac{37}{6} \quad \cancel{e) -1}$$

(55)

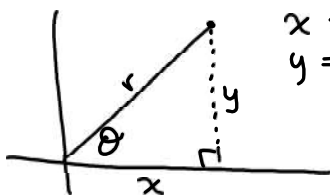
(59)

★ (P2) a) on day 101 (April 11th)
b) $0.637^\circ/\text{day}$

p 535

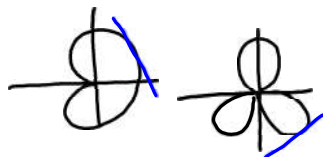
$$(12) \quad a) \frac{2t-1}{2t+1} \quad b) \frac{4}{(2t+1)^3}$$

10.3 Polar Derivatives



$$x = r \cos \theta$$

$$y = r \sin \theta$$



Slope of a tangent line to a curve given by $r = f(\theta)$ is still $\frac{dy}{dx}$.

Ex) Find slope of line tangent to $r = 2 \sin 3\theta$

when $\theta = \pi/6$.

$$x = r \cos \theta = 2 \sin 3\theta \cos \theta$$

$$y = r \sin \theta = 2 \sin 3\theta \sin \theta$$

$$\frac{dy}{dx}$$

$$\frac{dy/d\theta}{dx/d\theta} = \frac{2 \sin 3\theta \cdot \cos \theta + \sin \theta \cdot 2 \cos 3\theta \cdot 3}{2 \sin 3\theta \cdot -\sin \theta + \cos \theta \cdot 2 \cos 3\theta \cdot 3}$$

$$= \frac{2 \sin \frac{\pi}{2} \cdot \cos \frac{\pi}{6} + \sin \frac{\pi}{6} \cdot 2 \cos \frac{\pi}{2} \cdot 3}{2 \sin \frac{\pi}{2} \cdot -\sin \frac{\pi}{6} + \cos \frac{\pi}{6} \cdot 2 \cos \frac{\pi}{2} \cdot 3}$$

$$= \frac{2 \cdot 1 \cdot \frac{\sqrt{3}}{2} + \frac{1}{2} \cdot 2 \cdot 0 \cdot 3}{2 \cdot 1 \cdot -\frac{1}{2} + \frac{\sqrt{3}}{2} \cdot 2 \cdot 0 \cdot 3}$$

$$= -\sqrt{3}$$

Equation of tan line? $m = -\sqrt{3}$
 $(\sqrt{3}, 1)$

$$x = 2 \sin 3\theta \cos \theta$$

$$= 2 \sin \frac{\pi}{2} \cos \frac{\pi}{6}$$

$$= 2 \cdot 1 \cdot \frac{\sqrt{3}}{2}$$

$$= \sqrt{3}$$

$$y = 2 \sin 3\theta \sin \theta$$

$$= 2 \sin \frac{\pi}{2} \sin \frac{\pi}{6}$$

$$= 2 \cdot 1 \cdot \frac{1}{2}$$

$$= 1$$

$$y - 1 = -\sqrt{3}(x - \sqrt{3})$$

HW: p 558 #39-41 odds

p 153 #56 fgh

Graded HW: Due Thursday