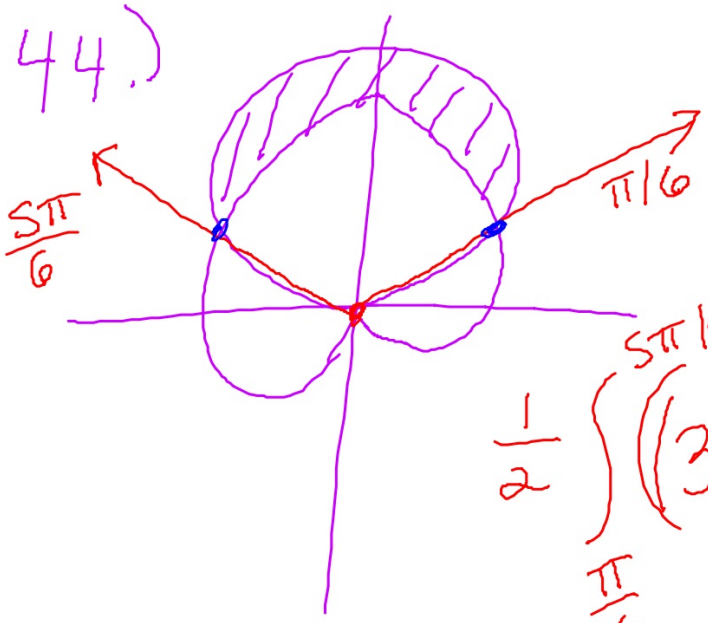
44.)



$$\frac{1}{2}\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}}\left[(3\sin\theta)^2-(1+\sin\theta)^2\right]d\theta$$

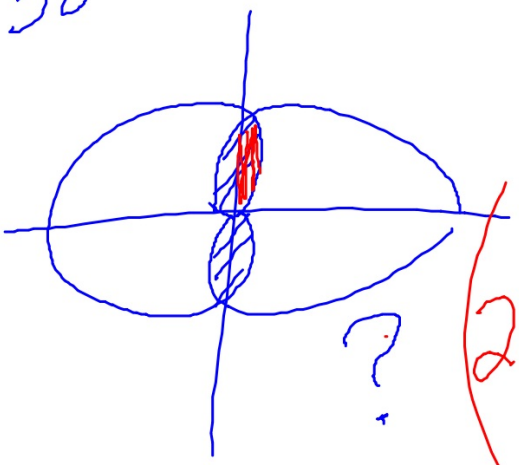
$3\sin\theta = 1+\sin\theta$

$2\sin\theta = 1$

$\sin\theta = \frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

38.)



?

$$4 \cdot \frac{1}{2} \int_0^{\pi/2} (2 - 2\cos\theta)^2 \, d\theta$$

$$2 \left(\frac{1}{2} \int_0^{2\pi} (2 + 2\cos\theta)^2 \right) - \frac{1}{2} \int_{\pi/2}^{3\pi/2} (2 + 2\cos\theta)^2 \, d$$

$$2 \cdot \frac{1}{2} \int_{\pi/2}^{3\pi/2} (2 + 2\cos\theta)^2 \, d\theta$$

9.5 Polar Area - AP Style Questions

2.

Let $r = \theta + \cos(3\theta)$ for $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$, where r is measured in meters and θ is measured in radians.

a) Find the area bounded by the curve and the y-axis.

$$\frac{1}{2}\int_{\pi/2}^{3\pi/2} (\theta + \cos 3\theta)^2 \, d\theta$$

*See printout.

2.

Let $r=\theta+\cos(3\theta)$ for $\frac{\pi}{2}\le\theta\le\frac{3\pi}{2}$, where r is measured in meters and θ is measured in radians.

b) Find the angle θ that corresponds to the point on the curve with y-coordinate -1.

$$y = r\sin\theta$$

$$-1 = (\theta+\cos(3\theta))\sin\theta$$

or

$$0 = (\theta+\cos(3\theta))\sin\theta + 1$$

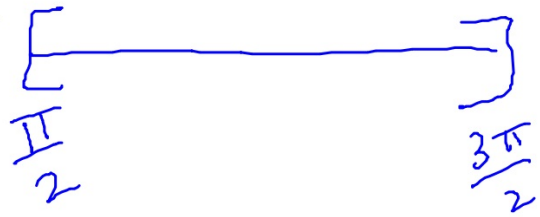
2.

Let $r = \theta + \cos(3\theta)$ for $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$, where r is measured in meters and θ is measured in radians.

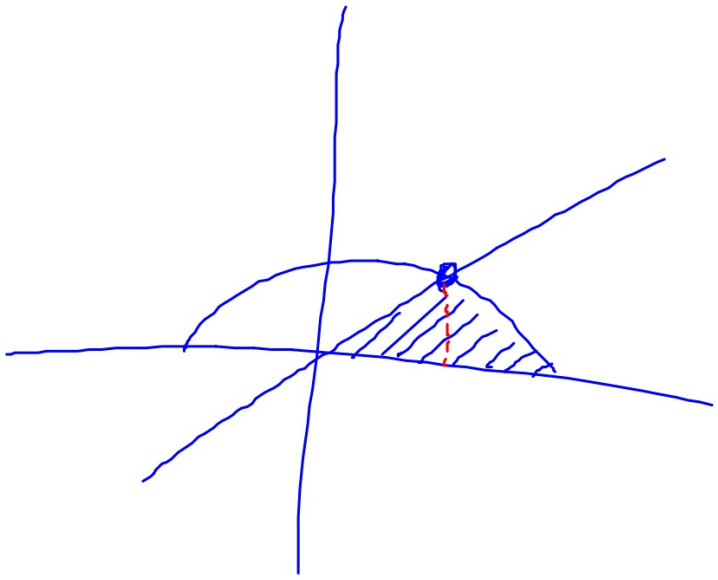
c) For what values of θ, $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$ is $\frac{dr}{d\theta}$ positive? What does this say about r?

$\frac{dr}{d\theta} = 1 - 3\sin(3\theta)$

$0 = 1 - 3\sin(3\theta)$



1a.



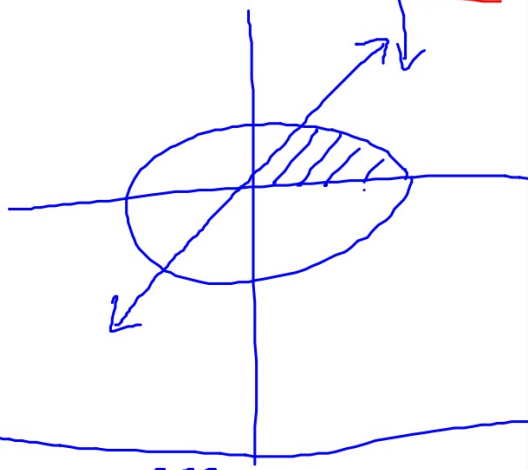
c.) $r = \sqrt{\dfrac{4}{\cos^2\theta + 4\sin^2\theta}}$

d.) $y = \frac{2}{3}x$

$r\sin\theta = \frac{2}{3} r\cos\theta$

$\tan\theta = \frac{2}{3}$

$\theta = \tan^{-1}\left(\frac{2}{3}\right)$



$$\frac{1}{2}\int_0^{.588} r^2\, d\theta$$

5.

(Calculator permitted) The area of the region enclosed by the polar graph of $r = \sqrt{3+\cos\theta}$ is given by which integral?

(A) $\int_0^{2\pi} \sqrt{3+\cos\theta}\,d\theta$ (B) $\int_0^{\pi} \sqrt{3+\cos\theta}\,d\theta$ (C) $2\int_0^{\pi/2} (3+\cos\theta)\,d\theta$

(D) $\int_0^{\pi} (3+\cos\theta)\,d\theta$ (E) $\int_0^{\pi/2} \sqrt{3+\cos\theta}\,d\theta$