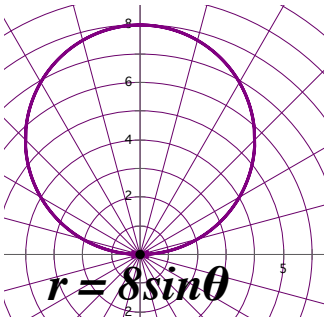
CH.10 WS Polar Area Name: _____

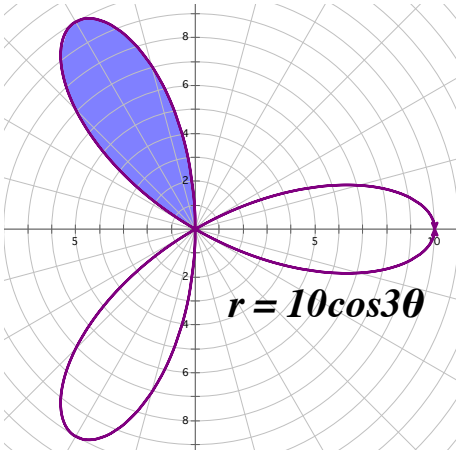
1) Find the area inside of $r = 8\sin(\theta)$.

a) Use polar.



b) Use Geometry.

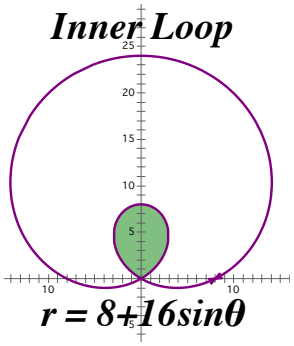
2*a*) Set up the integral that would find the area of the shaded leaf of $r = 10\cos(3\theta)$.



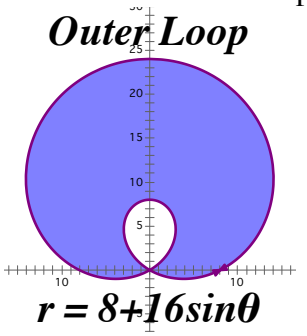
b) Find the area of the shaded leaf

3) Given $r = 8 + 16\sin\theta$, find:

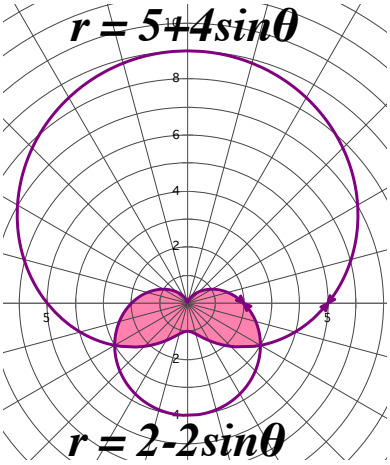
a) the Area of the Inner Loop



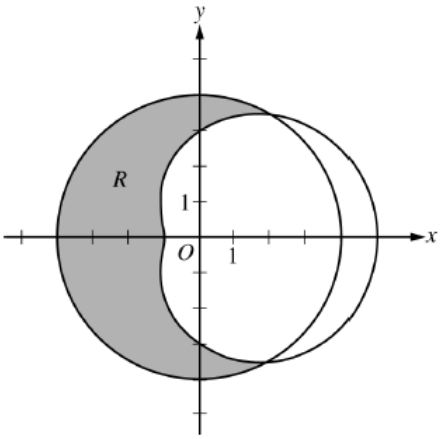
b) the Area of the Outer Loop



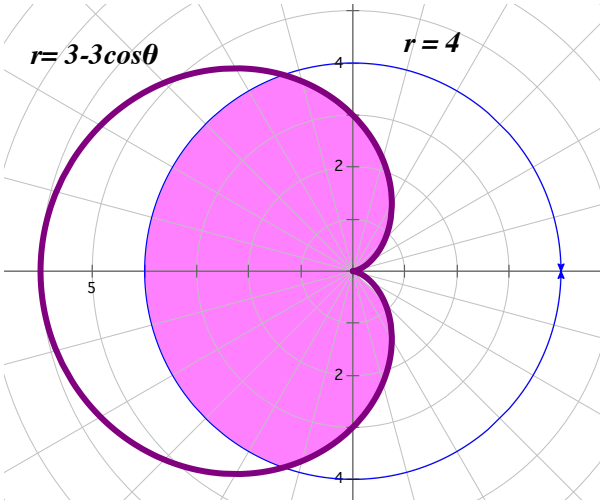
4) Find the area of the enclosed region between $r = 2 - 2\sin\theta$ and $r = 5 + 4\sin\theta$



5) Find the area of the region R inside the graph of $r = 4$ and also outside the graph of $r = 3 + 2\cos\theta$.



6) Find the area of the shaded region enclosed by $r = 3 - 3\cos\theta$ and $r = 4$.



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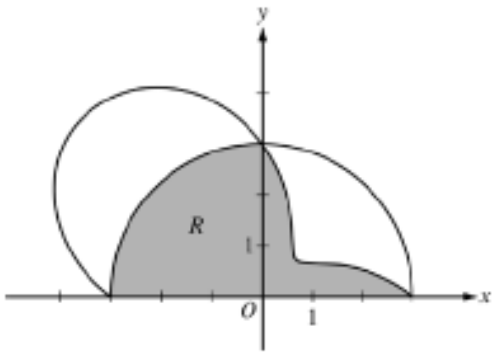
Question 2

The graphs of the polar curves $r = 3$ and $r = 3 - 2\sin(2\theta)$ are shown in the figure above for $0 \le \theta \le \pi$.



(a) Let R be the shaded region that is inside the graph of $r = 3$ and inside the graph of $r = 3 - 2\sin(2\theta)$. Find the area of R.

(b) For the curve $r = 3 - 2\sin(2\theta)$, find the value of $\frac{dx}{d\theta}$ at $\theta = \frac{\pi}{6}$.

(c) The distance between the two curves changes for $0 < \theta < \frac{\pi}{2}$.

Find the rate at which the distance between the two curves is changing with respect to θ when $\theta = \frac{\pi}{3}$.

(d) A particle is moving along the curve $r = 3 - 2\sin(2\theta)$ so that $\frac{d\theta}{dt} = 3$ for all times $t \ge 0$. Find the value of $\frac{dr}{dt}$ at $\theta = \frac{\pi}{6}$.

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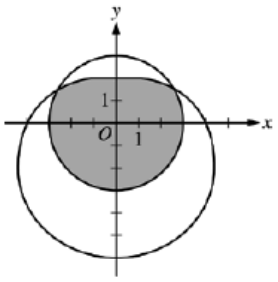
Question 2

The graphs of the polar curves $r = 3$ and $r = 4 - 2\sin\theta$ are shown in the figure above. The curves intersect when $\theta = \frac{\pi}{6}$ and $\theta = \frac{5\pi}{6}$.



(a) Let S be the shaded region that is inside the graph of $r = 3$ and also inside the graph of $r = 4 - 2\sin\theta$. Find the area of S.

(b) A particle moves along the polar curve $r = 4 - 2\sin\theta$ so that at time t seconds, $\theta = t^2$. Find the time t in the interval $1 \le t \le 2$ for which the x-coordinate of the particle's position is -1.

(c) For the particle described in part (b), find the position vector in terms of t. Find the velocity vector at time $t = 1.5$.