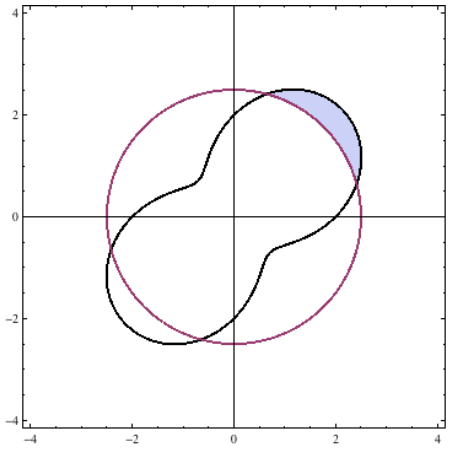
**8**. [14 points]

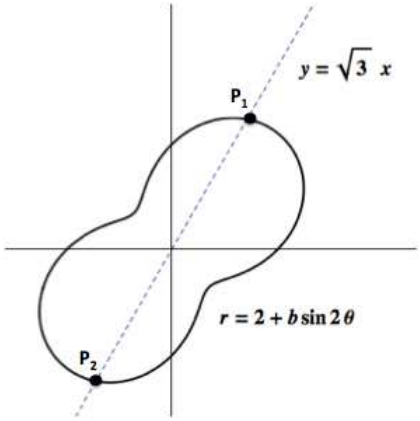
**a**. [6 points] Find a definite integral that computes the shaded area outside the circle $r = \frac{5}{2}$ and inside the curve given by $r = 2 + \sin 2\theta$ in the graph below.




**b**. [4 points] Find the polar coordinates $(r, \theta)$ of the points where the line $y = \sqrt{3}\, x$ intersects the graph of $r = 2 + b \sin 2\theta$. Here the constant $0 < b < 2$. Your answers may include $b$.

$P_1$=_____

$P_2$=_____



**c.** [4 points]

i) Find the equation in polar coordinates of the line $x = 0$.

ii) Find the equation in polar coordinates of the line $y = 4$.