• Please see the course webpage for the answer key.

For each of the following, do the following **THREE** things:

(A) Sketch the Polar Curve(s) and **Shade** the described bounded region.

(B) Compute the described bounded area.

(C) Set-Up but **DO NOT EVALUATE** another slightly different integral representing the same area of the described region.

1. Compute the area bounded outside the polar curve $r = 1 + \sin\theta$ and inside the polar curve $r = 3\sin\theta$.

2. Compute the area bounded outside the polar curve $r = 2 + 2\cos\theta$ and inside the polar curve $r = 6\cos\theta$.

3. Compute the area bounded between the polar curves $r = 1 + \sin\theta$ and $r = 1 - \sin\theta$.

4. Compute the area bounded between the polar curves $r = 2 + 2\cos\theta$ and $r = 2 - 2\cos\theta$.

5. Compute the area bounded outside the polar curve $r = 1 - \cos\theta$ and inside $r = -3\cos\theta$.

6. Compute the area **inside both** of the polar curves $r = 2\cos\theta$ and $r = 2\sin\theta$.

7. Compute the area bounded in all 4 petal loops of the polar curve $r = 3\sin(2\theta)$.

Challenge:

8. (a) Sketch the polar curve $r = 1 + 2\cos\theta$. Use the Cartesian plot to discover the Polar plot.

(b) Set-up, **BUT DO NOT EVALUATE!!**, the definite integral representing the area inside the larger loop.

(c) Set-up, **BUT DO NOT EVALUATE!!**, the definite integral representing the area inside the smaller loop.