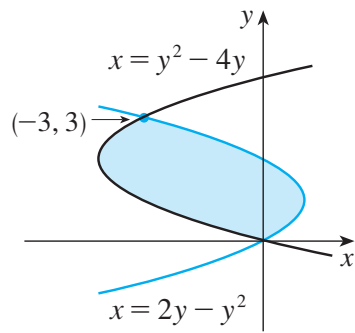
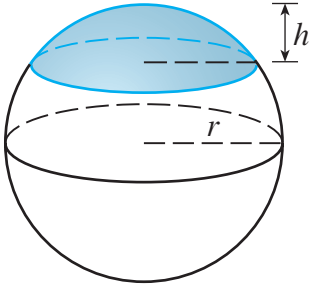


Directions Answer all questions in the space provided. Show all work and box your final answers. Answers with no work shown will not receive full credit. Good luck!

1. (8 points) Find the area of the shaded region.



2. (8 points) Find the volume of a cap of a sphere with radius r and height h .



3. (8 points) Find the volume of the solid generated by rotating the region bounded by

$$y = 4x - x^2 \quad \text{and} \quad y = 8x - 2x^2$$

about the line $x = -2$.

4. (8 points) Find the length of the following curve.

$$y = \ln(\cos x), \quad 0 \leq x \leq \pi/3$$

5. (8 points) A spring has a natural length of 2.5 meters. A force of 18 Newtons stretches the spring to a length of 5 meters. Determine how much work is done by stretching the spring 1.5 meters beyond its natural length.

6. (8 points) A 10-ft chain weighs 25 lbs and hangs from a ceiling. Find the work done in lifting the lower end of the chain to the ceiling so that it's level with the upper end.