

EE106 – Engineering Mathematics I

Problem Set 10

Due by 5pm on Friday, 14 December 2018

1. The function

$$f(x) = 3 \cosh(2x)$$

is rotated around the interval $[0, a]$, where a is a positive constant, to obtain a solid of revolution. Calculate its volume. You may find the following identity useful:

$$[\cosh(\theta)]^2 = \frac{1}{2} [\cosh(2\theta) + 1].$$

2. Consider the curve given by the function

$$g(x) = \sqrt{2x - x^2}$$

between $x = 0$ and $x = 2$. The region under this curve is rotated around the x -axis to give a solid of revolution. Calculate its volume.

3. Now we rotate the curve given in Problem 2 around the x -axis to get a surface of revolution. Calculate its area.
4. Now calculate the length of the curve given in Problem 2. (Hint: try the substitution $x = 2[\sin(\theta)]^2$ and use appropriate trigonometric identities to simplify the resulting integral.)