University of Bahrain
Department of Mathematics
MATHS122: Calculus II
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Worksheet 1: Volume

Students' Name: _____

For each of the following, set–up an integral that compute the volume of the solid generated by revolving the enclosed region about the given axis of revolution. (you can use any method you would like).

1. $y = 3x - x^2$, $y = 0$; about x–axis.

2. The region in the first quadrant bounded above by the curve $y = x^2$, below by the x–axis , and on the right by the line $x = 1$; about $x = -1$.

3. $y = 2x - 1$, $y^2 = x$, and $x = 0$; about y–axis

4. $y = x^3$, $y = 8$, $x = 0$;

1. about y–axis.

2. about x–axis.

3. about $x = -1$.

4. about $x = 4$.

5. about $y = -2$.

6. about $y = 7$.

5. $y = x^2$, $y = -x^4$, $x = 1$; about y–axis.

6. $y = e^{\frac{x}{2}}$, $y = 1$, $x = \ln 3$; about x–axis.

7. $x = (y-1)^2$, $x - y = 1$; about $x = -1$.

8. (a) Cavalieri's principle states that if a family of parallel planes gives equal cross–sectional areas for two solids S_1 and S_2, then the volumes of S_1 and S_2 are equal. Prove this principle. (Hint: Use the first definition of the volume in Section 6.1).

   (b) Use Cavalieri's principle to find the volume of the oblique circular cylinder of radius r and height h.

9. Derive the formula to find the arc-length of any curve $y = f(x)$