Indian Institute of Technology Delhi - Abu Dhabi

AMTL100: CALCULUS

Tutorial Sheet 9

(1) Find the volume of the solids generated by revolving the regions bounded by the lines and curves in the following exercises about the x-axis.
   (a) $y = x^2$, $y = 0$, $x = 2$
   (b) $y = \sqrt{\cos x}, 0 \le x \le \pi/2$, $y = 0$, $x = 0$
   (c) $y = e^{-x}$, $y = 0$, $x = 0$, $x = 1$
   (d) $y = x^2 + 1$, $y = x + 3$

(2) Use the cylindrical shell method to find the volumes of the solids generated by revolving the regions bounded by the curves and lines in the following exercises about the y-axis.
   (a) $y = x$, $y = -x/2$, $x = 2$
   (b) $y = x^2$, $y = 2 - x$, $x = 0$, for $x \ge 0$
   (c) $y = 2x - 1$, $y = \sqrt{x}$, $x = 0$

(3) Find the arc lengths of the curves in the following exercises.
   (a) $y = \frac{x^3}{3} + \frac{1}{4x}$, $1 \le x \le 3$
   (b) $y = \ln x - \frac{x^2}{8}$, $1 \le x \le 2$
   (c) $x = \frac{y^4}{4} + \frac{1}{8y^2}$, $1 \le y \le 2$
   (d) $y = \int_{-2}^{x} \sqrt{3t^4 - 1}dt, -2 \le x \le -1$

(4) Find the areas of the surfaces generated by revolving the curves in the following exercises about the indicated axis.
   (a) $y = x^3/9$, $0 \le x \le 2$; x-axis
   (b) $y = \sqrt{2x - x^2}$, $0.5 \le x \le 1.5$; x-axis
   (c) $x = 2\sqrt{4 - y}$, $0 \le y \le 15/4$; y-axis