MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

VOLUMES **Math 1001 Worksheet** FALL 2019

For practice only. Not to be submitted.

1. Use the disc-washer method to find the volume of the solid generated by rotating the indicated region about each of the given axes of revolution.

   (a) $y = \sqrt{x-2}$, $y = 0$, $x = 6$
      (i) rotated about the line $y = 0$
      (ii) rotated about the line $x = 0$
      (iii) rotated about the line $x = 6$

   (b) $y = x^2$, $y = 2x$
      (i) rotated about the line $y = 5$
      (ii) rotated about the line $y = -2$
      (iii) rotated about the line $x = 0$

   (c) $xy = 12$, $3x - y = 0$, $y = 2$
      (i) rotated about the line $x = -1$
      (ii) rotated about the line $x = 7$
      (iii) rotated about the line $y = 2$

2. Use the shell method to find the volume of the solid generated by rotating the indicated region about each of the given axes of revolution. For each axis of revolution, sketch a graph of the region and include a representative rectangle that generates a shell.

   (a) $xy = 12$, $3x - y = 0$, $y = 2$
      (i) rotated about the line $y = 2$
      (ii) rotated about the x-axis

   (b) $y = \sqrt{x}$, $y = 4 - \frac{1}{2}x$, $x = 0$
      (i) rotated about the line $x = 6$
      (ii) rotated about the line $x = -6$

   (c) $y = -x^2$, $x = -\frac{1}{8}y^2$
      (i) rotated about the y-axis
      (ii) rotated about the x-axis

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3. Derive the formula for the volume of a cone of radius a and height b using

   (a) the disc-washer method

   (b) the shell method

4. Use either the disc-washer method or the shell method to find the volume of the solid generated by rotating the indicated region about the given axis of revolution. Sketch a graph of the region and include a representative rectangle that generates a washer or a shell, as appropriate.

   (a) $y = 2x^2 - x + 2$, $y = x^3$, $x = 0$; about the x-axis

   (b) $y = x$, $y = 2 - x$, $y = -1$; about the line $y = 3$

   (c) $x = y^2 - 2$, $x = -y$; about the line $x = -2$