

## Recitation # 5: Length of Curves & Surface Area

### Group work:

**Problem 1** Find the length of the following curves (length is in feet):

(a)  $y = \frac{4}{3}x^{\frac{3}{2}}$  from  $(0, 0)$  to  $\left(1, \frac{4}{3}\right)$ .

(b)  $x = \frac{1}{9}e^{3y} + \frac{1}{4}e^{-3y}$  from  $\left(\frac{13}{36}, 0\right)$  to  $\left(\frac{265}{288}, \ln 2\right)$ .

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**Problem 2** Find the surface area of the surface generated by revolving the curve given by

(a)  $x = 2y^3$  from  $(0, 0)$  to  $(2, 1)$  about the  $y$ -axis.

(b)  $y = \frac{1}{6}x^3 + \frac{1}{2x}$  from  $\left(2, \frac{19}{12}\right)$  to  $\left(3, \frac{14}{3}\right)$  about the  $x$ -axis.

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**Problem 3** Set up an integral (or a sum of integrals) to find the perimeter of the region bounded by the curves  $y = 2x^2 - 5x + 13$  and  $y = x^2 + 6x - 11$ .

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**Problem 4** A steady wind blows a kite due west. The kite's height above the ground from horizontal position  $x = 0$  ft. to  $x = 80$  ft. is given by

$$y = 150 - \frac{1}{40}(x - 50)^2.$$

Set up the integral to find the distance traveled by the kite.

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