MTH 32 LECTURE NOTES (Ojakian)

Topic 2: Area Between Curves

OUTLINE
(References: 2.1)

1. Finding Area Between Curves:
   (a) With vertical representative rectangles
   (b) When the curves cross
2. Applications:
   (a) Velocity and Distance
   (b) Gini Index

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1. Conceptual Practice

PROBLEM 1. *For each picture on the board do the following:*

- *Draw a representative rectangle.*
- *Label the dimensions of the rectangle.*
- *Setup the area as a limit of Riemann Sums.*
- *Set-up the integral that computes the area.*

2. Area between curves: vertical rectangles

PROBLEM 2. *From the* Work Book *section 2, do exercises 1,2*

PROBLEM 3. *Do* Textbook *section 2.1: Exercises 3, 7, 8, 15*

3. Application: Velocity and Distance

Recall: Taking derivatives - Distance to Velocity to Acceleration (Taking integrals reverses).

PROBLEM 4. *Consider a car traveling 60 MPH.*

(a) Graph its velocity function and distance function.
(b) Note the connection between derivative and integral.
(c) Find the velocity after 2 hours and the distance traveled after 2 hours

PROBLEM 5. *Repeat the last question but now with the velocity function being a straight line if you go 0 to 60 in some number of seconds (we choose!).*

PROBLEM 6. *Recall the two versions of Fundamental Theorem of Calculus. Apply to the last question.*

PROBLEM 7. *Interprete some previous problems (area between curves) as velocity curves; say two different cars going 0 to 60 in different times. What is the meaning?*

4. Gini Index

From Handout ...

PROBLEM 8. *Do problem 2.*

See World Bank Data online for country comparison (they may give percents instead of decimals)