

Section 6.1 *Areas between curves*

6.1₁

Learning outcomes

After completing this section, you will inshaAllah be able to

1. use definite integrals to find area between two curves
 - a. know special tricks for properly setting up definite integrals to find area between two curves

Area between two functions of x

If $f(x) \geq g(x)$ on $[a, b]$ then the **area** A of the region between $f(x)$ and $g(x)$ over $[a, b]$ is

$$A = \int_a^b [f(x) - g(x)] dx \quad (*)$$

See explanation
given in class

General method

- make graphs
- find points of intersections (if needed) and determine $[a, b]$
- set up integral and solve it.

See examples 1, 2, 3, 4, 5 done in class

“In examples 2, 4, 5”

See special **trick** of

- dividing $[a, b]$ into subintervals
- and **using more than one integral**.

“In example 3”

- See **use of symmetry**

Area between two functions of y

- * Sometimes it is more convenient to find area by using integration along Y-axis (See example 6)

If we are given functions $x = f(y)$ and $x = g(y)$ with $f(y) \geq g(y)$ for $c \leq y \leq d$ then the **area** A of the region between $f(y)$ and $g(y)$ for $c \leq y \leq d$ is

$$A = \int_c^d [f(y) - g(y)] dy \quad (**)$$

See explanation
given in class

General method

- make graphs
- find points of intersections if needed and determine $[c, d]$
- set up integral

See examples 6, 7, 8 done in class

End of Section 6.1