

METIS

Lesson 9:

Area Under the Curve



Introduction

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Lecture Overview:



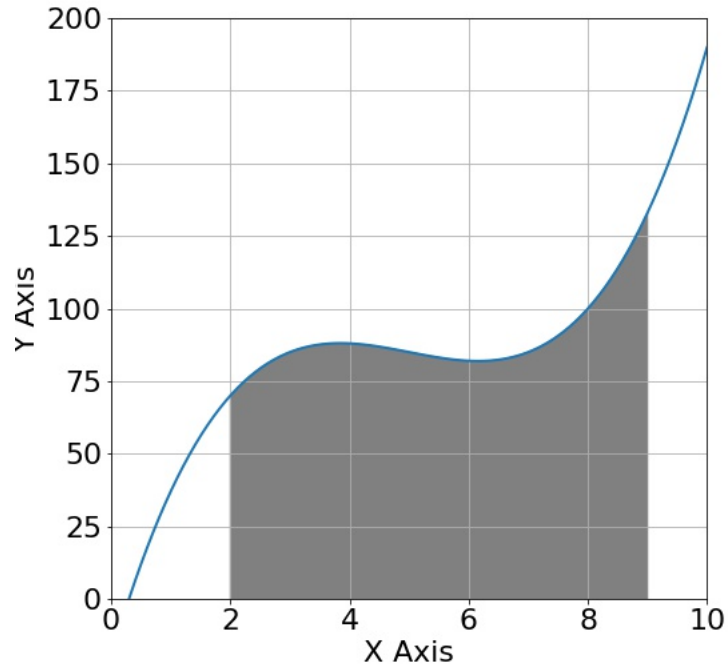
Goals of the lecture:

1. Determine how to calculate the area under the curve

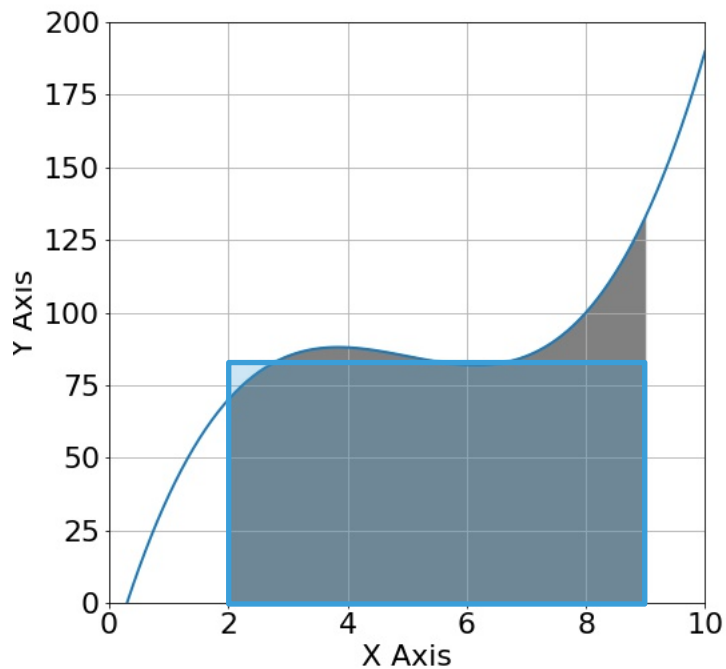
Area Under the Curve

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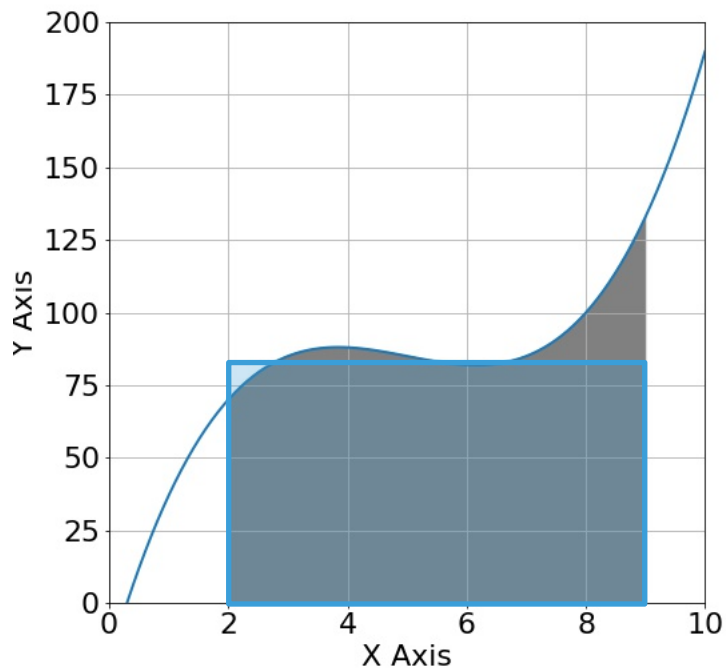
Area Under the Curve



Area Under the Curve

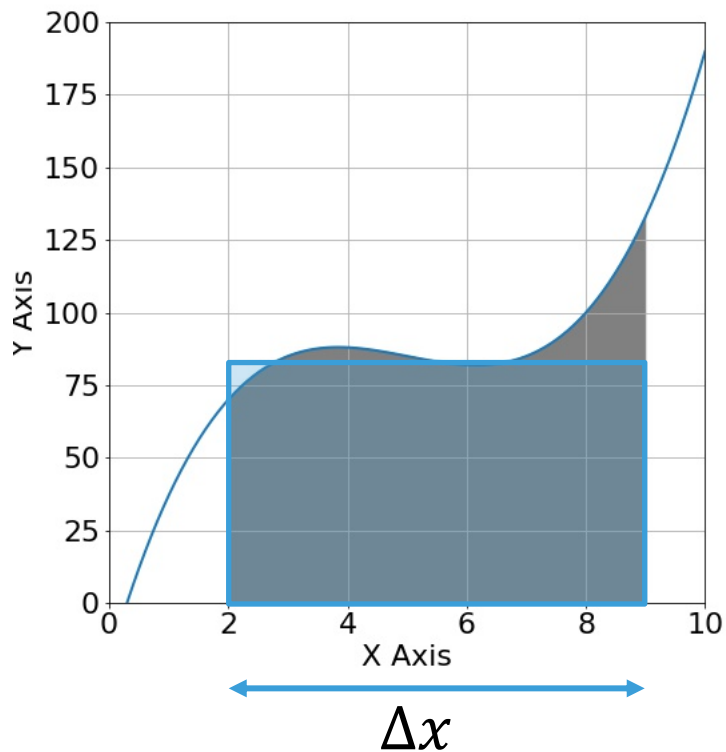


Area Under the Curve



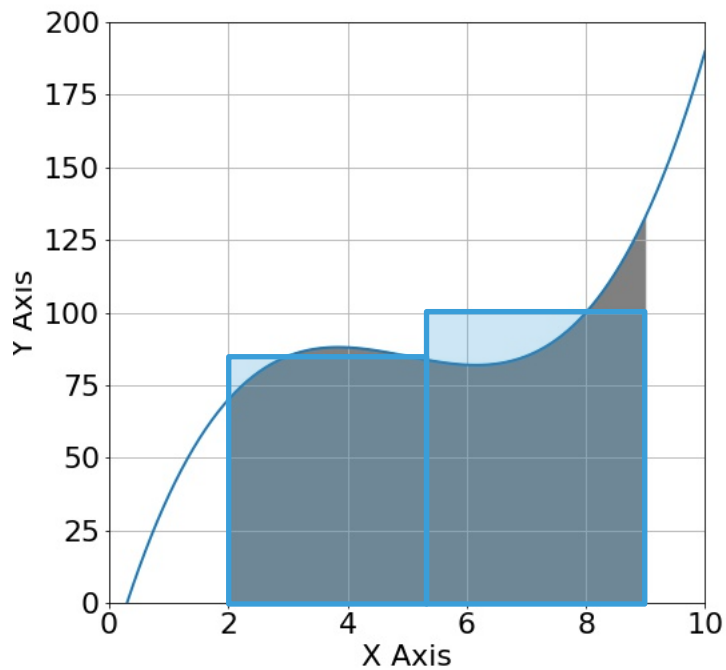
$$A = f(x)\Delta x$$

Area Under the Curve

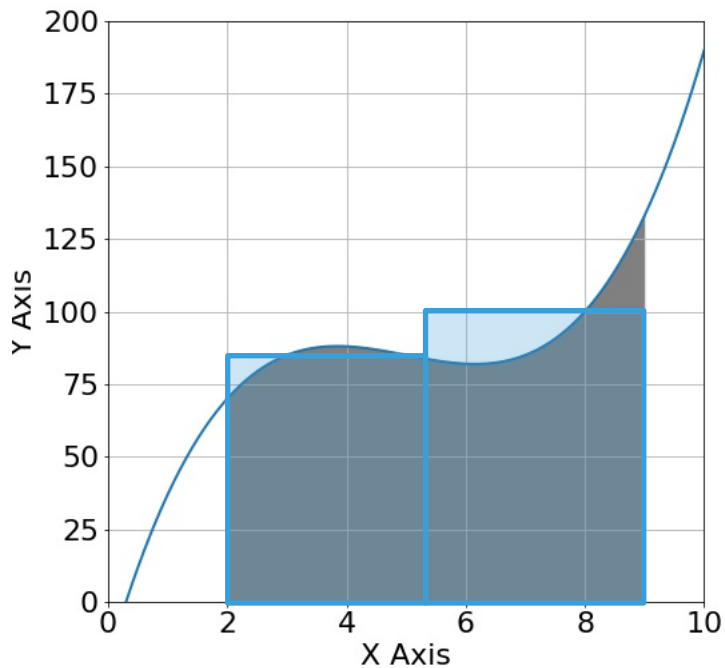


$$A = f(x)\Delta x$$

Area Under the Curve

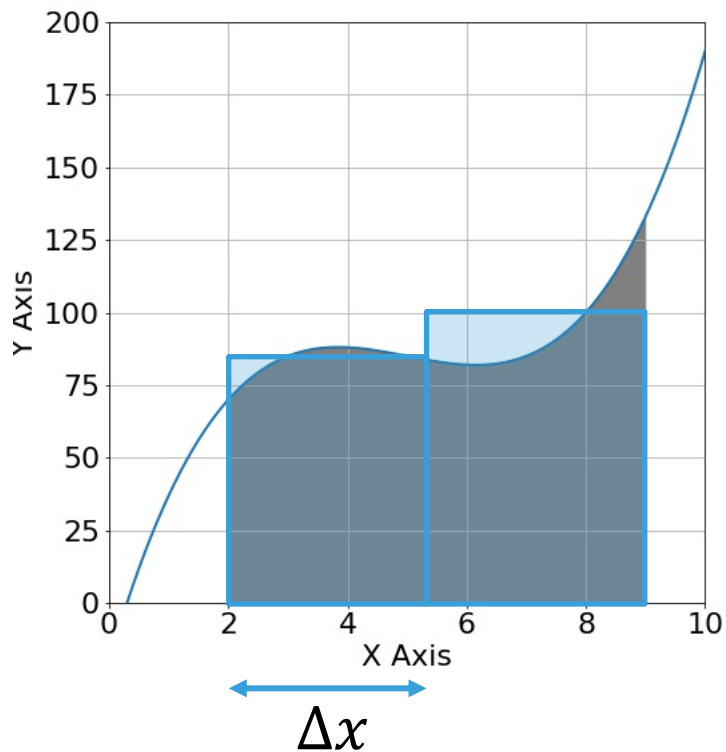


Area Under the Curve



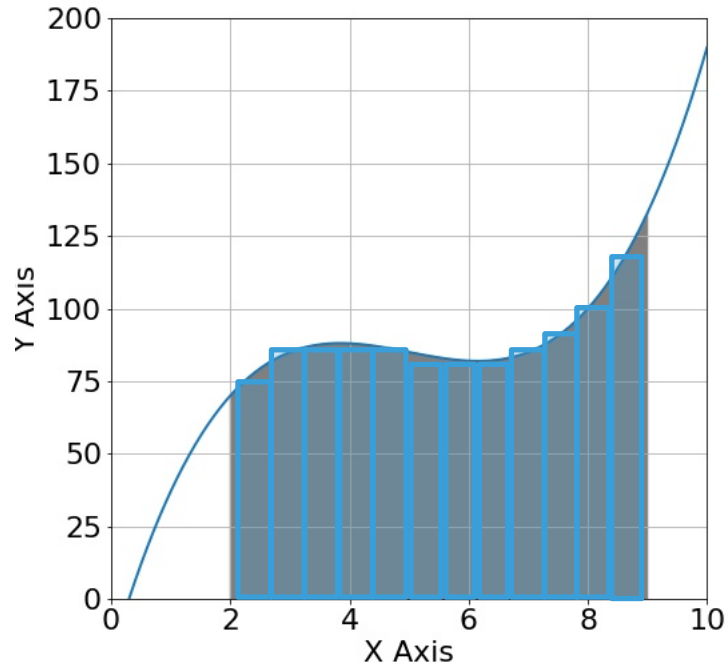
$$A = f(x_1)\Delta x + f(x_2)\Delta x$$

Area Under the Curve

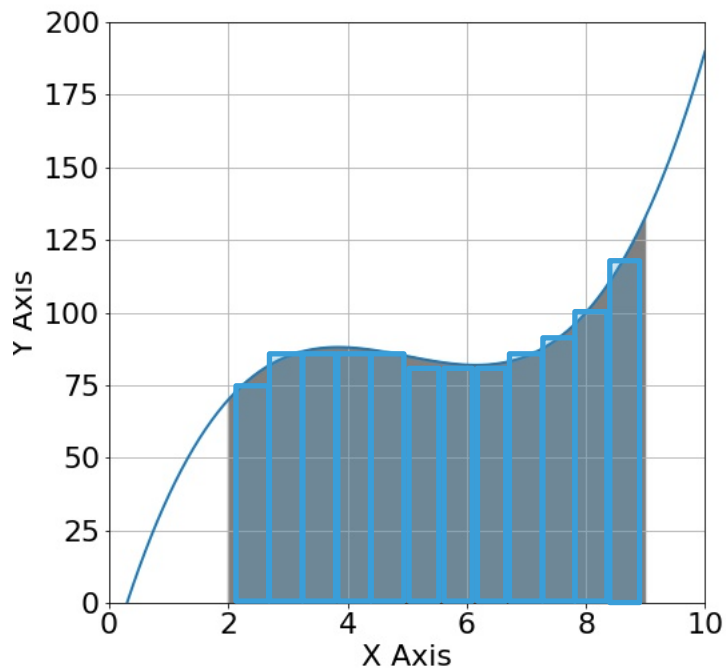


$$A = f(x_1)\Delta x + f(x_2)\Delta x$$

Area Under the Curve

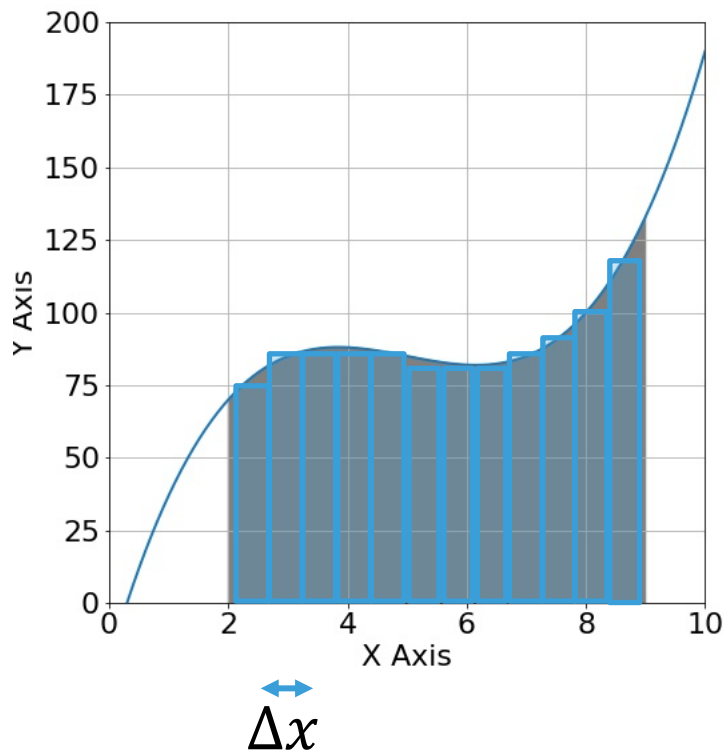


Area Under the Curve



$$A = \sum_{i=1}^k f(x_i) \Delta x$$

Area Under the Curve

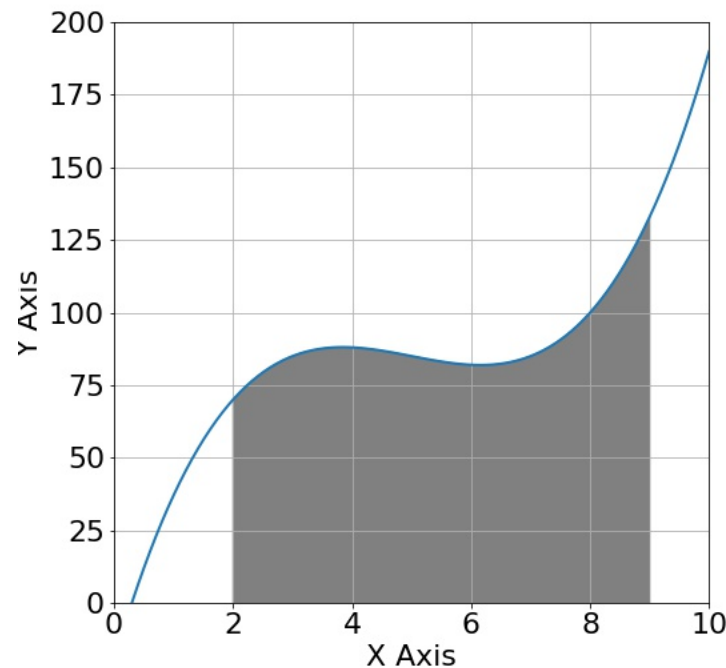


$$A = \sum_{i=1}^k f(x_i) \Delta x$$

Area Under the Curve



$$A = \lim_{k \rightarrow \infty} \sum_{i=1}^k f(x_i) \Delta x =$$

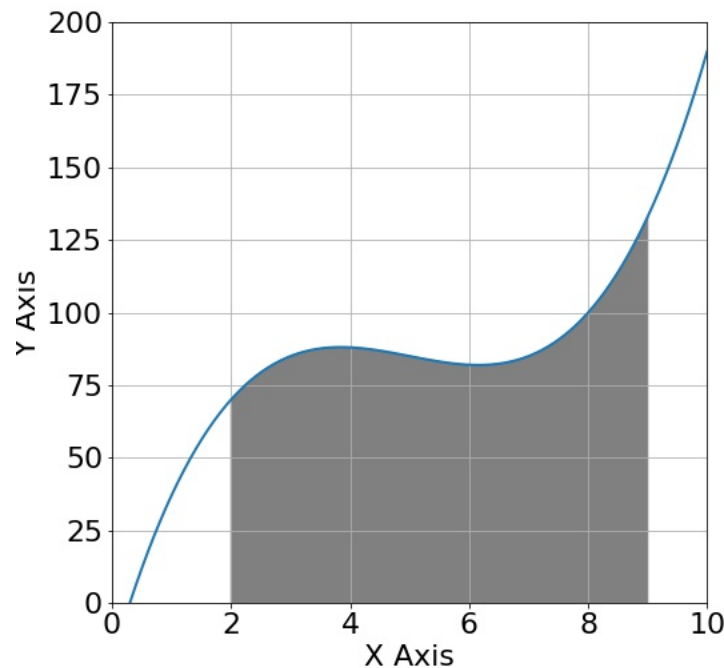


Area Under the Curve



$$A = \lim_{k \rightarrow \infty} \sum_{i=1}^k f(x_i) \Delta x =$$

$$\int_a^b f(x) dx =$$

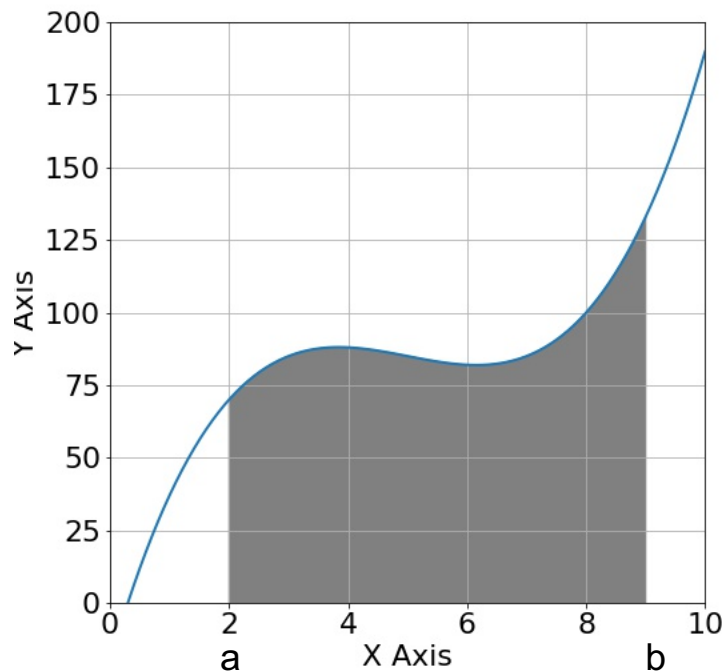


Area Under the Curve



$$A = \lim_{k \rightarrow \infty} \sum_{i=1}^k f(x_i) \Delta x =$$

$$\int_a^b f(x) dx =$$

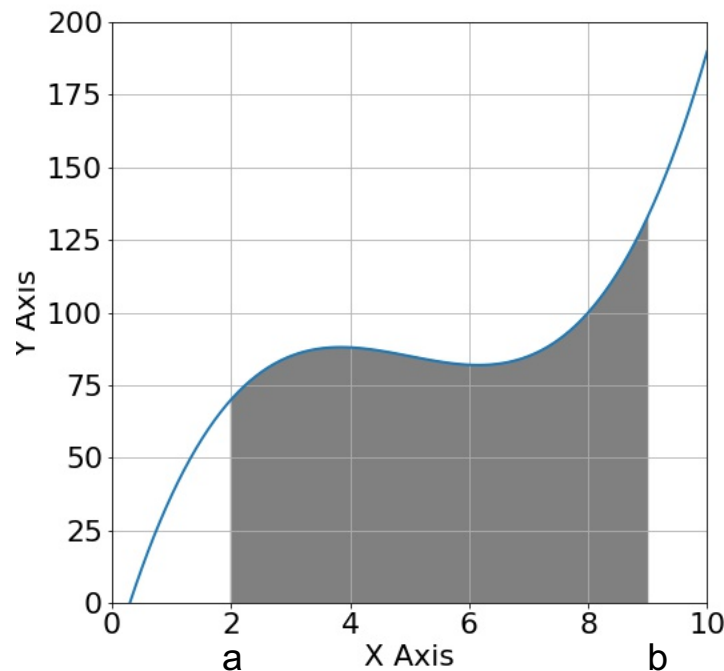


Area Under the Curve



$$A = \lim_{k \rightarrow \infty} \sum_{i=1}^k f(x_i) \Delta x =$$

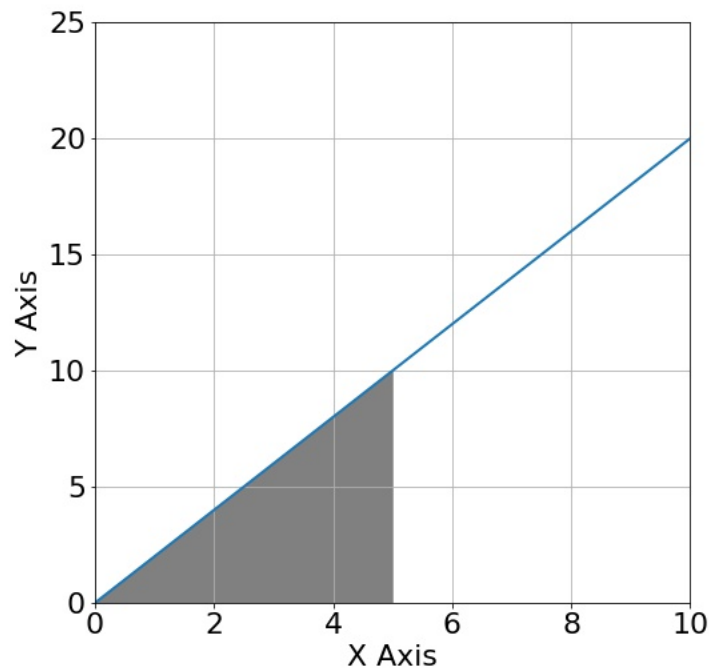
$$\int_a^b f(x) dx =$$
$$F(b) - F(a)$$



Area Under the Curve



$$\int_a^b f(x_i)dx = F(b) - F(a)$$

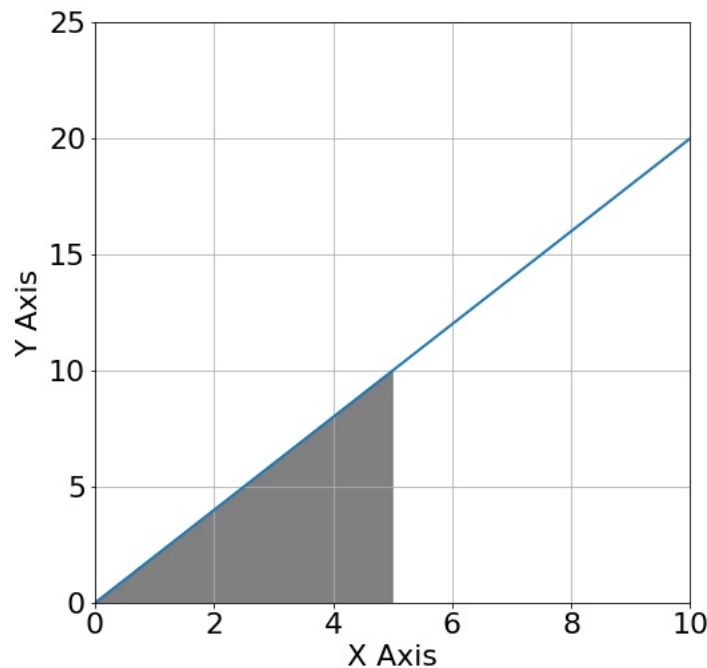


Area Under the Curve



$$\int_a^b f(x_i)dx = F(b) - F(a)$$

$$A = \frac{b \cdot h}{2} = \frac{5 \cdot 10}{2} = 25$$



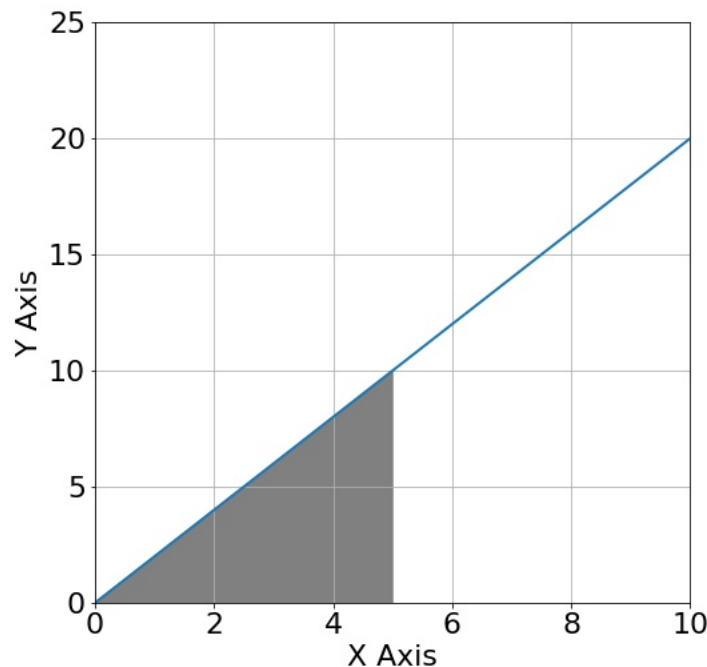
Area Under the Curve



$$\int_a^b f(x_i)dx = F(b) - F(a)$$

$$A = \frac{b \cdot h}{2} = \frac{5 \cdot 10}{2} = 25$$

$$\int_0^5 2x dx = x^2 = 5^2 - 0^2 = 25$$



Problem 1:



Problem 1: Calculate the AUC.

$$\int_0^2 (x-3)(x-5) dx$$

Problem 1:



Problem 1: Calculate the AUC.

$$\int_a^b f(x_i) dx = F(b) - F(a)$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C$$

$$\int_0^2 (x-3)(x-5) dx$$

$$\int_0^2 x^2 - 8x + 15 dx = \left. \frac{x^3}{3} - \frac{8x^2}{2} + 15x \right|_0^2 =$$

$$\frac{2^3}{3} - \frac{8 \cdot 2^2}{2} + 15 \cdot 2 + C - \left(\frac{0^3}{3} - \frac{8 \cdot 0^2}{2} + 15 \cdot 0 + C \right) =$$

$$\frac{8}{3} - 16 + 30 = 14 + \frac{8}{3}$$



QUESTIONS?
