Continuous Random Variable and Probability Density Function

Data Science and A.I. Lecture Series

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- The total probability must sum to 1:

$$\int_{-\infty}^{\infty} f(x)dx = 1.$$

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- Solving for A:

$$A \times \frac{1}{4} = 1 \Rightarrow A = 4.$$

Example: Probability Computation

Find $P(0.2 < X < 0.5)$ for $f(x) = 4x^3$, $0 \leq x \leq 1$.

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- Evaluate:
$$4 \times \left[\frac{x^4}{4}\right]_{0.2}^{0.5}.$$
- Solve:
$$\left[x^4\right]_{0.2}^{0.5} = (0.5)^4 - (0.2)^4 = 0.0625 - 0.0016 = 0.0609.$$

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