9 The Normal Distribution

Objectives:

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| Understand the use of the normal distribution to model a continuous random variable |
| Identify a normal distribution and learn how to standardise it |
| Learn to model real-world scenarios using the normal distribution |
| Learn the conditions under which a normal distribution can be used as an approximation to the binomial distribution |

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| Content | Teacher's Activity  | Student's Activity | Assignments |
| 9.1 Modelling continuous variables | * + Review probability distributions covered so far and point out that they deal with discrete random variables
	+ Transition to continuous variables using dimensions and masses as examples
	+ Using the textbook example, explain how histograms can be gradually refined to arrive at a bell-shaped curve that better models several continuous variables
 | * + Differentiate between discrete and continuous random variables
	+ Understand how to plot a histogram with relative frequency density on the y-axis and class intervals of a continuous variable on the x-axis
	+ Understand how a bell-shaped curve serves as a model for several continuous variables
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| 9.2 The normal distribution  | * + Introduce the terms "normal distribution" and "Gaussian distribution" with a bell-shaped curve as reference
	+ Point out the significant properties of the normal distribution that help in identifying it
	+ Explain how the area under this curve is the probability of the continuous variable for the specified interval
	+ Introduce the meaning of the notation X ~ N(µ, σ2 ) and explain the change in the shape of the curve as µ and σ change

  | * + Identify a normal distribution based on its chief characteristics and the Gaussian curve used to represent it
	+ Understand how the shape of a normal distribution changes with changes in µ and σ
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| 9.3 The standard normal distribution9.4 Standardising a normal distribution  | * + Diagrammatically explain the process of standardising a normal distribution such that it can be modelled by N(0, 1)
	+ Draw parallels with transformation/translation processes that shift the context of a problem statement to another familiar domain for which solutions are readily available (e.g. transform an oval to a circle with the same area and then calculate its area using the circle's area formula)
	+ Introduce the standard normal distribution tables used to calculate the probability for a given interval
	+ Through examples, calculate the probability of a continuous variable X ~ N(µ, σ2 ) by converting it to a standard normal distribution Z ~ N(0, 1)
 | * + Convert a given statement about N(µ, σ2 ) into an equivalent statement about a N(0, 1) distribution
	+ Using the standard normal distribution tables, calculate the probability for a given interval of a continuous variable
	+ Given the probability for an unknown interval, use the standard normal distribution tables to find the limits of the unknown interval

  | * + Ex 9A
	+ Ex 9B
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| 9.5 Modelling with the normal distribution | * + Through textbook examples, explain how to model a real-world problem using a normal distribution
	+ Demonstrate how the real-world problem is then solved using the standard normal distribution tables
 | * + Model a real-world problem using a normal distribution
	+ Solve real-world problems using the standard normal distribution tables
 | * + Ex 9C
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| 9.7 N(µ, σ2 ) as an approximation for B(n, p) | * + Explain the conditions under which a binomial distribution can be approximately represented by a normal distribution
	+ Solve sample B(n, p) problems using N(np, npq)
 | * + Understand when a normal distribution can be used to approximate a binomial distribution
	+ Identify situations where B(n, p) can be converted into N(np, npq) and find solutions using standard normal distribution tables
 | * + Ex 9 D
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| Catch-up class | Clear doubts |   |   |
| Test |   |   |   |