YEAR 12 - MATHEMATICS

HSC Topic 17 – The Normal Distribution

MATHEMATICS ADVANCED

LEARNING PLAN			
Learning Intentions Student is able to:	**Learning Experiences** Implications, considerations and implementations:	**Success Criteria** I can:	**Resources**
Students develop understanding of the probability density function, how integration or the area under the function determines probabilities to solve problems involving random variables. Students make connections between calculus skills developed earlier in the course and their applications in Statistics, and lay the foundations for future study in this area.			
Identify the numerical and graphical properties of data that is normally distributed		I can compare the different shapes of data and understand that the normal approximation will form a bell curve.	
Calculate probabilities and quantiles associated with a given normal distribution using technology and otherwise, and use these to solve practical problems	– identify contexts that are suitable for modelling by normal random variables, eg the height of a group of students – recognise features of the graph of the probability density function of the normal distribution with mean and standard deviation , and the use of the standard normal distribution		

	– visually represent probabilities by shading areas under the normal curve, eg identifying the value above which the top 10% of data lies		
Understand and calculate the z-score (standardised score) corresponding to a particular value in a dataset	– use the formula $z = \frac{x-\mu}{\sigma}$, where μ is the mean and σ is the standard deviation – describe the z-score as the number of standard deviations a value lies above or below the mean	I can use the z-score to determine the number of standard deviations a given score is from the mean.	
Use z-scores to compare scores from different datasets, for example comparing students' subject examination scores	– apply the empirical rule to a variety of problems – sketch the graphs of $f(x) = e^{-x^2}$ and the probability density function for the normal distribution $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ using technology – verify, using the Trapezoidal rule, the results concerning the areas under the normal curve	I understand that theoretically there will be percentages that lie within a given standard deviation from the mean. I can sketch the basic exponential and show through dilations and translations that a more complex equation may be given to find the equation for the normal distribution. I can use the Trapezoidal rule on the complex equation to show that the areas below the curve will be close the the percentages in the Empirical rule.	
Use z-scores to identify probabilities of events less or more extreme than a given event		I can use z-scores to answer practical problems.	

Use z-scores to make judgements related to outcomes of a given event or sets of data			
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Established Goals(Syllabus Outcomes):

› solves problems using appropriate statistical processes MA12-8
› chooses and uses appropriate technology effectively in a range of contexts, models and applies critical thinking to recognise appropriate times for such use MA12-9
› constructs arguments to prove and justify results and provides reasoning to support conclusions which are appropriate to the context MA12-10