

Goals

By the end of this week, you should be able to:

- understand probability distributions for discrete random variables
- distinguish between discrete and continuous random variables
- construct probability histograms
- compute the central tendency and variability of discrete distributions (ie. find the mean and variance of a discrete probability distribution)
- compute the 95% confidence interval for a random variable, given the mean and the variance



Theoretical Components

Resources:

- Maths Quest Year 12 Chapter 10

Read through Section 10B on Discrete Probability Distributions. Study and make notes on Examples 12-17.

http://www.youtube.com/watch?v=j_Kredt7vY&list=PL4C863861E3B2E380

<http://www.youtube.com/watch?v=OvTEhNL96v0&list=TL1pBhdAQ4PrpbEtslhLFJqszYvaUiVnhp>

“Forgive me, for those of you who play the lottery — but economists, at least among themselves, refer to the lottery as a stupidity tax, because the odds of getting any payoff by investing your money in a lottery ticket are approximately equivalent to flushing the money directly down the toilet.”
(Dan Gilbert)

Read through Sections 10C and 10D
Study and make notes on Examples 18-32.

Nice set of notes and useful examples:

<http://www.intmath.com/counting-probability/11-probability-distributions-concepts.php>

Practical Components

Complete the following questions. Organise your solutions neatly in your exercise book.

You will require Chapter 10 of Maths Quest Methods (pdf – Google Classroom).

Ex 10B Discrete random variables

- Qs 1, 3, 5, 7, 8, 11, 17, 24

EX 10C Expected value of discrete random distributions

- Qs 1, 3, 10, 12, and 18

EX 10D Variance and standard deviation of discrete random distributions

- Qs 3, 5, 7, 14, 15, 20, 24

Investigation

See the following page.

QFO

Quiz/Forum/Other

Do the Cambridge Task.

Remember to check in with Serene every lesson.



MM3 Week 15/16 Investigation

A door-to-door telecommunications representative has recorded her day-by-day sales figures over a period of time. She knows that her probability of selling X packages on any one day follows the probability distribution shown in the table.

x	0	1	2	3	4	5	>5
$\Pr(X = y)$	$2t^2$	$3t$	$2t^2$	$2t$	$4t^2 + t$	t	0

- i) Find the value of t .

- ii) Find the probability that she sells at least 2 packages on any one day.

- iii) Find the probability that she sells at most 4 packages on any one day.

- iv) Find the number of packages she can expect to sell each day.

- v) Calculate the $\text{Var}(X)$ and standard deviation of X , correct to 4 decimal places.

- vi) Find $\Pr(\mu - 2\sigma \leq X \leq \mu + 2\sigma)$.

- vii) If the representative receives a commission of \$25 per package sold and a bonus of \$200 if she sells 4 or more packages in one day, find her expected daily earnings from commissions and bonuses.

- viii) Given that the representative will sell at least two packages tomorrow, find the probability that she will get her \$200 bonus.