**Week** 13/14
**Term** 2
**2019**

HAWKER COLLEGE
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**Learning Brief MM3**
**Discrete Random Variables**

# Goals

By the end of this fortnight, 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 (i.e. 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

Focus for Week 13

- Practise more applications of integration and area
- Catch up on overdue mathspace.co tasks

# Theoretical Components

You will require Chapter 10 of Quest Mathematical Methods 12 (Jacplus e-text)

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=TL1pBhdAQ4PrpbEtsIhLFJqszYvaUiVnhp

Why we make bad decisions:
http://www.ted.com/talks/dan_gilbert_researches_happiness.html
“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)

Study and make notes on Examples 12-31.

Expected Value:
http://www.knowmia.com/watch/lesson/2925

Nice set of notes and useful examples:

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

# Practical Components

Do the following questions
Ex 9G Q2a,e,f Q4, Q11, Q14, Q19, Q20
Ex 9H Q1a,e,f,g Q5, Q11, Q13, Q14
Ex 9J Q1

Review Probability
Ex 10A: As many as you can

Do the following questions
EX 10B: 1,3,5,7,8,11,13,17,24
EX 10C: 1, 3, 10, 12, and 18
EX 10D: 3, 5, 7, 14, 15, and 20

# Investigation

**Week 13**

Show worked solutions to the following questions

- EX 9J Q7 and Q11

**Week 14**

See the following page:

# QFO

Quiz/Forum/Other

Catch up on overdue mathspace.co tasks. Absences need to be sorted.

Week 14 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 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.