Week 11
Term 2
2016

Learning Brief

Specialist Mathematics (AC)
Unit 1

Goals

$$P \Rightarrow Q$$

By the end of this unit, students:

- understand the concepts and techniques in combinatorics, geometry and vectors
- apply reasoning skills and solve problems in combinatorics, geometry and vectors
- communicate their arguments and strategies when solving problems
- construct proofs in a variety of contexts including algebraic and geometric
- interpret mathematical information and ascertain the reasonableness of their solutions to problems.

This week's focus:

Nature of Proof

- Counter Examples
- Equivalence
- Induction

Theoretical Components

STEP 1:

Read examples:

- ABOUT/RESOURCES/2016 S1/WK11/Reading
- http://goo.gl/9GoSW4
- https://goo.gl/1E2bSe
- http://goo.gl/WoS6j7

Counter Examples & Equivalence:

- http://goo.gl/ngez5G

Proof by Induction:

- https://goo.gl/4EqNNp
- https://goo.gl/GUirvl

P ractice! "Look at proofs in lecture notes and textbooks to get a good idea of how proofs should be written."

R ead your proofs aloud – if it doesn't make sense to someone listening, then you haven't written enough".

O rganise your work! "Students often struggle to present their work in a logical order – the classic example is starting from the conclusion and deducing the premise".

O btain more examples! " Construct own examples on which you can run proofs (this is only a tool for better understanding and does not replace the proofs)".

F eedback. "Consider it carefully – understanding how you could have phrased the argument better will improve future work".

Practical Components

STEP 2:
Attempt all the questions:
ABOUT/RESOURCES/2016 S1/ WK11/

Investigation

A: Show that $2^{3n+1} + 5$ is always a multiple of 7.

B: Prove the following by mathematical induction:

i) $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\ldots\left(1-\frac{1}{n^2}\right) = \frac{n+1}{2n}$

$for\ n \geq 2.$

ii) $7^n - 3^n$ is divisible by 4, $\forall\, n \in \mathbb{N}$

Show clear working to get full marks.

"Understand every line that you write, and do not make bogus claims."

Q/F/O
(Quiz/Forum/Other)

Complete this quiz:
http://goo.gl/2uNrhK
You may take notes for future reference.