Transitions to Higher Mathematics
Portfolio Draft

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1 Chapter 4

(Use direct proof)

Problem 8

Proposition. *Suppose a is an integer. If $5 \mid 2a$ then $5 \mid a$*

Proof. □

Problem 18

Proposition. *Suppose x and y are positive real numbers. If $x < y$, then $x^2 < y^2$.*

Proof. □

2 Chapter 5

Problem 10 (Use contrapositive proof)

Proposition. *Suppose $x, y, z \in \mathbb{Z}$ and $x \neq 0$. If $x \nmid yz$, then $x \nmid y$ and $x \nmid z$.*

Proof. □

Problem 22 (Use contrapositive/direct proof)

Proposition. *Let $a \in \mathbb{Z}, n \in \mathbb{N}$. If a has a remainder r when dvided by n, then $a \equiv r \pmod{n}$.*

Proof. □

3 Chapter 6

Problem 4 (Use contradiction)

Proposition. *$\sqrt{6}$ is irrational*

Proof. □

Problem 8 (Use contradiction)

Proposition. *Suppose $a, b, c \in \mathbb{Z}$. If $a^2 + b^2 = c$ then a or b is even.*

Proof. □

4 Chapter 7

Problem 6

Proposition. *Suppose* $x, y \in \mathbb{R}$. *Then* $x^3 + x^2 + y = y^2 + xy$ *if and only if* $y = x^2$ *or* $y = x$

Proof. □

5 Chapter 8

Problem 2

Proposition. $\{6n : n \in \mathbb{Z}\}$=$\{2n : n \in \mathbb{Z}\} \cap \{3n : n \in \mathbb{Z}\}$

Proof. □