Transitions to Higher Mathematics Portfolio Draft

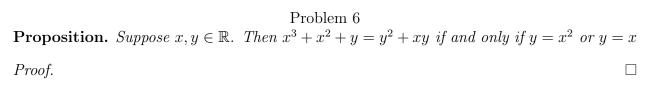
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Mustafa Rashid Fall 2024

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



5 Chapter 8

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