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zfp106
Homework Assignment 3
CS 2233
Section 001

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Problems

Problem 1. [10 points]

- Complete all participation activities in zyBook sections 2.1, 2.2, 2.4-2.6.

Done

Problem 2. [10 points]

Prove that if a, b, and c are odd integers, then $a + b + c$ is an odd integer.

An odd integer is expressed as $2k + 1$ where k is some integer.

$a + b + c$ can be rewritten as $(2z + 1) + (2n + 1) + (2p + 1)$. Working this equation we end up with: $2z + 2n + 2p + 3$. We can then factor out 2 giving us $2(z + n + p) + 3$ and with some additional manipulation we can get $2((z + n + p) + 1) + 1$. Notice the inner part $((z + n + p) + 1)$ could be re-expressed as k, thus we can rexpress the entire thing (with a substitution) as $2k + 1$ where $k = (z + n + p + 1)$. Therefore, if a, b, and c are odd integers, then $a + b + c$ is an odd integer.

Problem 3. [30 points]

Recall that a rational number can be put in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$ Prove the following for any rational number, x:

a.) If x is rational, then $x - 5$ is rational

b.) If $x - 5$ is rational, then $\frac{x}{3}$ is rational

c.) If $\frac{x}{3}$ is rational, then x is rational

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Problem 4. [20 points]

Consider the following statement: For all integers m and n, if $m - n$ is odd, then m is odd or n is odd.

a. Prove the statement using a proof by contrapositive

b. Prove the statement by using a proof by contradiction