Discrete Math Proofs

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1 Homework Answers

2.1 Yes, because it's a whole number and cannot be divided by 2

$$2k+1 = n2k+1 \qquad = -12k = -2k \qquad = -1$$

Since odd integers are represented using 2k +1 and -1 was represented in that we can determine -1 is an odd integer.
2.3 m X n = 2k+1 where m and n are odd numbers

$$M = 2a+1N = 2b+1MN \quad = (2a+1)(2b+1)4ab+2a+2b+1 = 2k+12(2ab+a+b)+1 \quad = 2k+12a$$

j is also an integer just like k.
2.5 2 isn't cube rootable into an integer A and b exist such that a and b = 2k+ 1 Any rational number can be written as a simplified fraction

$$3sqrt2b = a2b^3 \qquad = a^3 2b^3 = (2k)^3 2b^3 \qquad = 8k^3 b^3 = 4k^3$$

Would continue forever so its irrational
2.7 If it is a fair die then all the sides are the same meaning there is no reason for one side to be more likely landed upon. 7 / 7 is 1 there is enough pigeons for there holes meaning sides are all equal. The surface area is equivalent for all of them
2.9

(a) If $a = c^2$ and $b = d^2$ then $ab = m$ where $m = n^2$

(b) $36 = 6^2$ and $2! = 18$ and $2 * 18 = 26$ and sqrt of 2 is irrational and sqrt of 18 is irrational

(c) $9 > 4$ and $3^2 = 9$ and $2^2 = 4$ then $3 > 2$. Based on the rules of multiplication, a bigger number multiplied more times than a smaller number will always be bigger than the smaller number.

2.11 Since it splits $(x+y)(x-y) > 0$ there needs to be the extra proof $x-y > 0$ so $x > y$ as well because if x is less than y, it is also less than a negative y only if y is positive $A > Z$ and $A > -Z$ if Z is positive.
2.13

(a) For any x in set z that is positive and real, there exists n and m of Z which are distinct, such that x is equal to the square root of n and m.

(b) For every x in set z that is even, or divisible by 2, there exists n and m of Z which are prime , such that x is equal to n * m

2.15 If X knows 5 people and they're either his friend or not there must at any given time be 3 people who are either his friend or are not his friend.