Name: ____

Part 1: Definitions and Concepts

1) Let n be an integer. State the definition for n to be an even integer. Be precise: vague answers will be given no credit.

The integer n is even if there is some integer k such that $n = 2k$.

OR

$$\exists_{k\in\mathbb{Z}}(n = 2k)$$

Partial credit varies based on what you said.

No credit if you do not specify the equation $n = 2[something]$ somewhere.

2) Let n and m be integers. State the definition for n to divide m. Be precise: vague answers will be given no credit.

The integer n divides the integer m if there is some integer k such that $m = kn$.

OR

$$n \text{ is odd if } \exists_{k\in\mathbb{Z}}(m = kn)$$

Partial credit varies based on what you said.

No credit if you do not specify the equation $n = km$ or the incorrect equation $kn = m$ somewhere.

3) Determine whether the following are true or false.

T or F (I) 5|20

T or F (II) 3|20

T or F (III) 12|4

T or F (IV) 18 is even.

T or F (V) 0 is even.

Part 2: Proofs

4) Let n be an even number. Prove that $n + 7$ is an odd number.

Let n be an even number. Then we can write $n = 2k$ for some $k \in \mathbb{Z}$. Now we show that $n + 7$ is odd:

$$n + 7 = 2k + 7 = 2k + 6 + 1 = 2(k + 3) + 1$$

Because $k + 3 \in \mathbb{Z}$, the above equation shows that $n + 7$ is odd.