Name: __________________________________ **Quiz 2**

Math 301 Discrete Mathematics – Crawford **6 March 2019**

Books, calculators, and notes (in any form) are <u>not</u> are allowed. Show all your work for credit. ***Good luck!***

1. (8 pts) State whether the following arguments are valid or invalid. If it is a valid argument, state whether the form is modus ponens or modus tollens. If it is an invalid argument, state whether it exhibits the converse error or the inverse error.

(a). All safe drivers obey the traffic laws.
Mayhem is not a safe driver.
$\therefore$ Mayhem does not obey traffic laws.

(b). All Jedi use the Force.
Rey uses the Force.
$\therefore$ Rey is a Jedi.

(c). All tourists in Chicago eat deep dish pizza
Jill did not eat deep dish pizza.
$\therefore$ Jill is not a tourist in Chicago.

2. (4 pts) Indicate whether the following argument is valid or invalid. Support your answer by drawing diagrams.

All discrete mathematics students can tell a valid argument from an invalid one.
All thoughtful people can tell a valid argument from and invalid one.
$\therefore$ All discrete mathematics students are thougthful.

3. (4 pts) Fill in the blanks to the following proof.

<u>THEOREM</u> Whenever n is an odd integer, $3n^2 + 5$ is even.

<u>PROOF</u> Suppose n is any odd integer. [Show that ______________ .]

By definition of odd, $n =$ __________ for some integer k.

Then

$$\begin{aligned} 3n^2 + 5 &= \underline{\hspace{4cm}} \\ &= 3(4k^2 + 4k + 1) + 5 \\ &= 12k^2 + 12k + 3 + 5 \\ &= 12k^2 + 12k + 8 \\ &= \underline{\hspace{4cm}} \\ &= 2s \text{ where } s = \underline{\hspace{3.5cm}}, \end{aligned}$$

And s is an __________ since ______________________________ .

i.e., $3n^2 + 5 = 2s$, for integer s.

Therefore by ____________ , $3n^2 + 5$ is even. ■

4. (2 pts) Disprove the following statement by giving a counterexample:

For all integers n, if n is prime then $(-1)^n = -1$.

5. (2 pts) Prove:

There are distinct integers a and b such that $\dfrac{1}{a} + \dfrac{1}{b}$ is an integer.