**Name:** **Roll #:** **Section:**

# HW-4.1-4.3

1. (25 *points*) Consider the following statement:

$\forall$ rational numbers $r$ & $s$, $\frac{r}{s}$ is rational.

a) (7 *points*) Prove that the above statement is false.

b) (18 *points*) Fill in the blank that makes the statement true & then prove the resulting statement:

$\forall$ rational numbers $r$ & $s$, if _____ , then $\frac{r}{s}$ is rational.

2. (10 $points$) Determine if the following statement is true or false and prove your answer.

$\forall$ integers $m$ & $n$, if $2m + n$ is odd, then both $m$ & $n$ are odd.

3. (20 $points$) Consider the following statement:

*"The product of <u>any</u> two odd integers is odd"*

a) (5 $points$) Write the above as a **<u>universal conditional statement</u>** symbolically using quantifiers and variables.

b) (15 $points$) Determine if the given statement is true or false. If it is true, prove it using the definition of odd integers. If it is false, disprove it.