Howard University Math Department

Instructions:

PLEASE PROVIDE STEP BY STEP EXPLANATIONS

WRITING ONLY ANSWERS WILL NOT GET FULL CREDIT

Time Limit 30 minutes

Please read the questions carefully before answering

1. (10 points) Write the following statement and its negative using nested quantifiers, given that domain of discourse is set of integers times itself ($\mathbb{Z} \times \mathbb{Z}$). Let $E(n)$ denote "n is an even number."

   "Given any two even numbers, their sum is another even number."

2. (10 points) Prove directly: If x is odd and y is even then $x + y$ is odd. (NOT enough to give examples!)

3. (10 points) Prove using contrapositive: If $x + y$ is irrational, then x or y is irrational.