

Name & UID: _____

Circle Your Section!			
0101 (10am: 3120, Ladan)	0102 (11am: 3120, Ladan)	0103 (Noon: 3120, Peter)	
0201 (2pm: 3120, Yi)	0202 (10am: 1121, Vikas)	0203 (11am: 1121, Vikas)	0204 (9am: 2117, Karthik)
0301 (9am: 3120, Huijing)	0302 (8am: 3120, Huijing)	0303 (1pm: 3120, Yi)	250H (10am: 2117, Peter)

1. (20 points) What must be the case if the sum of any three integers is odd but their product is even?
 - (a) Form a conjecture about the three numbers.

 - (b) Prove your conjecture. Use may use the facts that the sum of two evens is even, two odds is even, and an even and odd is odd; and the product of two evens is even, two odds is odd, and an even and odd is even.

2. (20 points) Prove by contradiction that the sum of a rational number and an irrational number is irrational.

3. (20 points) Prove that the non-zero rationals are closed under division.

4. (20 points) Prove that there is an irrational number between any two rationals. You may use the following two lemmas: (1) The sum of a rational and an irrational is irrational, and (2) the product of a non-zero rational and an irrational is irrational.

5. (20 points) Prove, using cases, that for any real number x : if $|x - 10| < 3$, then $x > 7$.