

Name: \_\_\_\_\_

Panther ID: \_\_\_\_\_

Worksheet - August 22

MAT 3501

Fall 2017

1. (a) Use a direct proof to show that the sum of three consecutive integers is always a multiple of 3.  
(b) Is the sum of three consecutive integers always a multiple of 6?
  
2. (a) Prove that the sum, difference, product, or quotient of two rational numbers is also rational. For quotient, assume additionally that the denominator is not zero.  
(b) Prove that the sum of a rational number with an irrational number is irrational. (Hint: Use contradiction and part (a).)  
(c) Formulate (carefully!) a similar statement as (b) for product.  
(d) Is the sum or product of two irrational numbers necessarily irrational?
  
3. Suppose  $n$  lines are drawn in the plane so that no two lines are parallel and no three lines are concurrent. Find a formula, in terms of  $n$ , for the number of regions determined in the plane.  
*Hint:* The obvious hint for such problems is to start with small values of  $n$  and investigate for an eventual pattern.