**For each of these problems:**

* If appropriate use the Sigma notation for a sum rather than the ellipses (…)
* b) Show a basis case. (You can do more than one if you want.) Is it true or false?
* What would the inductive hypothesis be? (what we assume in the inductive step)
* What would we try to prove during the induction?
* Prove it.

**1)** What is the sum of the first n odd integers? (First, you need to come up with the formula, then prove it)

**2)** What does this formula equal? 1+ 2 + 22 + 23 + 24 + … + 2n

**3)** For all n >= 5, 4n < 2n

**4)** Show that 12 + 22 + … +n2 = n(n+1)(2n+1)/6 whenever n is a positive integer. Use induction.

**5)** Prove using induction that whenever n is a positive integer:

1•2 + 2•3 + … +n•(n+1) = n (n+1)(n+2)/3

**6)** Show that

1•(1!) + 2•(2!) + … + n•(n!) = (n-1)!

**7)** Show that 5 divides n5-n whenever n is a non-negative integer.

**8)** Show that 6 divides n3-n whenever n is a non-negative integer.