MATH 1210 Assignment #1

Due: September 24 2008, In Class

Reminder: all assignments must be accompanied by an honesty declaration. Show all your work. Unjustified answers will receive little or no credit.

1. Use Mathematical Induction to prove the following:

(a)
$$5 + 11 + 17 + \dots + (6n - 1) = n(3n + 2)$$

(b)
$$3^2 + 6^2 + 9^2 + \dots + (3n)^2 = \frac{3n(n+1)(2n+1)}{2}$$

(c)
$$5^{2n} - 1$$
 is divisible by 8

(d)
$$\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots + \frac{1}{3^{2n}} = \frac{1}{2}(1 - \frac{1}{9^n})$$

(e)
$$n + (n+1) + (n+2) + \dots + (3n) = 2n(2n+1)$$

2. Evaluate the following sums:

(a)
$$\sum_{i=1}^{13} (3i)(2i-4)$$

(b)
$$\sum_{j=7}^{17} (7j^3 - 4j)$$

(c)
$$\sum_{k=17}^{43} (k-16)^2$$

3. Write the following in summation notation. (DO NOT EVALUATE)

(a)
$$-3+6-9+12-15+\cdots-51$$

(b)
$$\frac{1}{2} + \frac{3}{4} + \frac{5}{6} + \dots + \frac{41}{42}$$

(c)
$$\frac{\sqrt{3}}{2} - \frac{\sqrt{5}}{4} + \frac{\sqrt{7}}{6} - \frac{3}{8} + \dots + \frac{5}{26}$$

4. Put the expression into sigma notation and then use known sums to evaluate it (into an expression in n). Simplify if possible.

$$2+4+6+\cdots+(2n)$$

$$1^2 + 2^2 + 3^2 + \dots + (3n)^2$$

$$1+3+5+7+\cdots+(4n-1)$$

$$n^{2} + (n+1)^{2} + (n+2)^{2} + \dots + (2n)^{2}$$