**Homework #1 MME 529**

1. Use Euclid's Algorithm to find the gcd of each pair

   **a) 24,138 b) 159 , 414 c) 272 and 1479 d) 4144 and 7696**

2. Use the prime factorization of the numbers in Problem 1 to find their gcd's. (feel free to use software for the prime factorization)

3. a) If **a|b** and **a|c** prove that **a|(b+c).**

   b) prove **gcd(ta,tb) = t gcd(a,b)**

4. A student claims that **($2n+1$, $2n^2 + 2n$, $2n^2 + 2n + 1$)** give Pythagorean Triples

   a) verify it *does* generate Pythagorean Triples (i.e satisfy the Pythagorean Theorem)
   b) can you find one triple that it does *not* generate? (this would then prove that it only produces a proper subset)
5. Argue that the sum of the squares of two odd numbers must always be even.
6. What is the sum of

   **100+103+106+ . . . + 1399** ?

7. For a general arithmetic series with n+1 terms **a + (a+d) + (a+2d) + . . . (a+nd)** Can you work out a formula for the sum?
8. Can you prove the arithmetic series formula $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$ by *induction*?
9. What are the possible values of **gcd(n,n+2)** where **n** is any possible positive integer ?

10. a) Use Geometric series to sum the first n powers of 2 $1 + 2 + 2^2 + .. + 2^{n-1}$
    a) What is the *binary* form of $2^7 - 1$ ? $2^9 - 1$ ? $2^n - 1$ ? (by *binary* is meant base 2)

11. Consider numbers of the form $2^{pq} - 1$ where p and q are integers greater than 1. See if you can factor this. (hint: use Geometric Series )

12. Write Maple or Matlab code to generate a list of PTs as discussed in **Problem #4**. Do a screen shot and include it in your work turned in. Which ones are PPTs ?