Fall 2019 COT 3100 Section 2 Homework #2
Please Consult WebCourses for the due date/time

1) Prove that if n is an odd integer, then 8 | (n^2 - 1). You may use a previously proved result from class that for any integer a, a(a+1) is an even integer.

2) Prove or disprove: If an integer n has three unique prime divisors, then if follows that the largest prime divisor of n is less than or equal to $\sqrt[3]{n}$.

3) A triangle has all integer side lengths and two of those sides have lengths 9 and 16. Consider the altitudes to the three sides. What is the largest possible value of the ratio of any two of those altitudes?

4) Consider the two different numbers 327_b (327 is base b) and 327_{b+1} (327 in base b+1), where b is a positive integer 8 or greater. If the difference between these two numbers is 89, what is the value of b?

5) Let S = {2, 6, 8, 9} and T = {1, 2, 5}. Explicitly list the members of the following sets: $S \cup T$, $S \cap T$, $S - T$, $S \times T$, $T \times S$, $\wp(S)$ and $\wp(T)$.

6) Use set laws to prove that the two following sets are equivalent.

$$(1)\overline{(\bar{A} \cap \bar{B}) \cup (C \cap \bar{C})} \cup ((A \cup B) \cap (A \cap B)) \qquad (2)\ A \cup B$$

7) Give a summary of life and work of mathematician Maryam Mirzakhani. Please aim for a length of roughly 200 - 400 words. ***Your summary must be typed.*** Please state the sources you used in writing your summary.