Math 307 Discrete Mathematics Exam II SOLUTIONS

1.a. 53 = 1*36+1736 = 2*17+217 = 8*2+1So, gcd(53,36)=1

b. 1=17*53-25*36

c. 53-25=28

2. $C(11,8) = \frac{11!}{3!8!} = (11*10*9)/(3*2) = 165$

- 3. a. $1^2 + 2^2 + 3^2 + \dots + 8^2$
- b. $\theta(n^3)$

4. $|2n^2 - 50n + 130n \lg n + 58| \le 2n^2 + 50n + 130n \lg n + 58 \le 2n^2 + 50n^2 + 130n^2 + 58n^2 = 240n^2$

5.a. R is not reflexive since $1 + 1 \leq 1$ and so $(1, 1) \notin R$.

b. R is antisymmetric. Let $x, y \in \mathbb{R}$ and $x \neq y$. Assume (x, y) and (y, x) are both in R. Then $x + 1 \leq y$ and $y + 1 \leq x$. But this means $x + 2 \leq y + 1 \leq x$, which is a contradiction.

6.a. ((1,1),(3,4)); b. ((1,1),(6,4));

c. Suppose (a, b)R(c, d) and (c, d)R(e, f). Then a + c = 2n and c + e = 2m. So a + e = 2n + 2m - 2c. So (a, b)R(e, f).

d. [(1,2)] consists of all ordered pairs $(a,b) \in \mathbb{Z} \times \mathbb{Z}$ where the first coordinate (that is, a) is odd.

e. two. Those whose first coordinate is odd and those with first coordinate even.

7.a. P(10,6); b. P(9,5); c. 6*P(9,5); d. P(9,5) + 6*P(9,5)-5*P(8,4); e. $10^6 - 10$; f. C(6,2) * C(4,3) * 8