Khrystian Clark
CS-225: Discrete Structures in CS
Homework 8, Part 2
Exercise Set 9.5: #7.b((ii), (iii)), #12, #16.(a, b)
Exercise Set 9.6: #4, #13, #18

Set 9.5:

7. b) ii. $\binom{13}{7} - \binom{7}{7} \equiv \frac{13!}{7!(6!)} - \frac{7!}{7!(0!)} = \frac{13 \times 11 \times 9 \times 8}{6} - 1 = 1,715$ [ans]

    iii. $\binom{6}{6}\binom{7}{1} + \binom{6}{5}\binom{7}{2} + \binom{6}{4}\binom{7}{3} \equiv (1 \times 7) + (6 \times 21) + (15 \times 45) = 808$ [ans]

12. $\binom{101}{2} \ \Xi \ \frac{101!}{2!(99!)} = \frac{101 \times 100}{2} = 101 \times 50 = 5,050$, then we divide by 2 because statistically half of these values have an even sum, which is what we are to show.

$$[ans]\ 2525$$

16.

    a) $\binom{40}{5} = \frac{40!}{5!(35!)} = 39 \times 38 \times 37 \times 12 = 658,008 \ possible\ combinations\ of\ 5\ out\ of\ 40$

    b) Previous answer $- \binom{37}{5}$

        $\frac{37!}{5!(32!)} = 37 \times 9 \times 6 \times 17 \times 11 = 373,626$

    $[ans]\ 658,008 - 373,626 = 24,382 \ samples\ will\ contain\ at\ least\ one\ defective\ chip$

Set 9.6:

4.

    a) $\binom{30 + 8 - 1}{30} = \binom{37}{30} = \frac{37!}{30!(7!)} = 37 \times 34 \times 33 \times 8 \times 31 = 10,295,472$

    b) $\binom{26 + 8 - 1}{26} = \binom{33}{26} = \frac{33!}{26!(7!)} = 11 \times 16 \times 31 \times 29 \times 27 = 4,272,048$

    c) Subtract solution b from solution a: $10,295,472 - 4,272,048 = 6,023,424$

13. $\binom{24 + 4 - 1}{24} = \binom{27}{24} = \frac{27!}{24!(3!)} = \frac{27 \times 26 \times 25}{3!}$

18.

    a) $\binom{30 + 120 - 1}{30} = \frac{149!}{30!119!} = \frac{149 \times 148 \times 147 \times ..... \times 120}{30!}$

    b)