Homework #10

Section 6.4

2.b) $(x+y)^5 = \binom{5}{0}x^5y^0 + \binom{5}{1}x^4y^1 + \binom{5}{2}x^3y^2 + \binom{5}{3}x^2y^3 + \binom{5}{4}x^1y^4 + \binom{5}{5}x^0y^5$

$= x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$

4.) $\binom{13}{8} = \frac{13!}{8!5!} = 1287$

7.) $\binom{19}{9} 2^{10} \cdot (-x)^9 = -\frac{19!}{9!10!} 2^{10} x^9 = -92378 \cdot 1024x^9 = -94595072$

12.b) $y^{15} = (y^3)^5$

$\binom{6}{5} \cdot (5x^2)^1 \cdot (2y^3)^5 = \frac{6!}{5!1!} \cdot 5x^2 \cdot 2^5 \cdot y^{15} = \frac{6!}{5!1!} \cdot 32x^2y^{15} = 960x^2y^{15}$

$= -960$

16.) 1 11 55 165 330 462 462 330 165 55 11 1

Section 7.1

7.) each flip is $\frac{1}{2}$

$P(1) = \frac{1}{2}$ $P(2) = \frac{1}{2}$ .... $P(5) = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{64}$

12.) $\frac{\binom{52}{5}}{\binom{4}{1} \cdot \binom{48}{4}} = \frac{3243}{10829}$

21.) outcomes $= 6^6$ even outcomes $= 729$ $\frac{729}{46656} = \frac{1}{64}$

36.) 2 dice : $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ since theres 5 combos, $\frac{5}{36}$

3 dice : $\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{216}$ since 21 combos, $\frac{21}{216}$

$\frac{5}{36} > \frac{21}{216}$ So 2 dice more likely.

Section 7.2

5.) $(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)$

$P(1,6) = \frac{1}{7} \cdot \frac{1}{7} = \frac{1}{49} = P(2,5)\ P(3,4) = P(5,2) = P(6,1)$

$P(4,3) = \frac{2}{7} \cdot \frac{2}{7} = \frac{4}{49}$ $\Rightarrow$ $\frac{1+1+1+2^2+1+1}{7^2} = \boxed{\frac{9}{49}}$

6.a) $\{1,2,3\},\{1,3,2\},\{2,1,3\}$

$= \frac{3}{3!} = \frac{1}{2}$

6.b) $\{3,2,1\},\{3,1,2\},\{2,3,1\}$

$= \frac{3}{3!} = \frac{1}{2}$

6.c) $\{3,2,1\},\{3,1,2\}$

$\frac{2}{3!} = \frac{1}{3}$

10a) $P(26,26) = 26!$ $P(13,13) = 13!$

need to pick 13 remaining

A: $\frac{13!}{26!}$

10.b) $P(26,26) = 26!$ $P(24,24) = 24!$ still need to pick 24

A: $\frac{24!}{26!} = \frac{1}{650}$

10.c) $P(26,26) = 26!$ $P(25,25) = 25!$ a2 next each other is 1 peremutation

A: $\frac{2 \cdot 25!}{26!} = \frac{1}{13}$

10.d) A: $\dfrac{26! - 2\cdot 25!}{26!}$ Since a,b not next to each other

10.e) A: $\dfrac{6\cdot 24!}{26!}$ Since 6 ways to order a, z

10.f) A: $\dfrac{\frac{26!}{3}}{\frac{26!}{1}} = \dfrac{1}{3}$ Z precedes a,b so its multiplied by $\frac{1}{3}$

18a) $1\cdot\frac{1}{7} = \frac{1}{7}$

18.b) $n=2$, $1-\frac{7}{7}\cdot\frac{6}{7} = \frac{1}{7}$ $n=3$, $1-\frac{7}{7}\cdot\frac{6}{7}\cdot\frac{5}{7} = \frac{19}{49}$, $n=4$, $\frac{223}{343}$

$n=5$, $\frac{2041}{2401}$. $n=6$, $\frac{16087}{16807}$. $n=7$ $\frac{116929}{117649}$ $n>7$, 1

18.c) $n \geq 4$

24.) $P(A\cap B) = \dfrac{\binom{4}{4}}{2^5} = \dfrac{1}{32}$ $P(A) = \frac{1}{2}$

$P(B|A) = \dfrac{\frac{1}{32}}{\frac{1}{2}} = \boxed{\frac{1}{16}}$

30a) $p = \frac{1}{2}$

$P(X=10) = \binom{10}{10}\cdot\left(\frac{1}{2}\right)^{10}\cdot(0.5)^0 = \frac{1}{1024}$

30b) $p = 0.6$

$P(X=10) = \binom{10}{10}\cdot 0.6^{10}\cdot(1-0.6)^0 = \frac{59049}{9765625}$

30.c) $P(X_i=1) = \frac{1}{2^i}$ $P(X_1=1)\cdot P(X_2=1)\ldots P(X_{10}=1)$

$= \frac{1}{2^1}\cdot\frac{1}{2^2}\cdots\cdot\frac{1}{2^{10}}$

$= \frac{1}{2^{55}} = \frac{1}{2^{55}}$