Solutions to Exam I

1. 3240

2.

p	q	r	$\neg r$	$p \vee q$	$\neg r \underline{\vee} p$	$(p \vee q) \rightarrow (\neg r \underline{\vee} p)$
0	0	0	1	0	1	1
0	0	1	0	0	0	1
0	1	0	1	1	1	1
0	1	1	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	1	1	1
1	1	0	1	1	0	0
1	1	1	0	1	1	1

3. (a) If today is Tuesday, then it is snowing.
   (b) If the chair is blue, then the sun is shining.

4. (a) $11!/(2!4!4!)$
   (b) $\left(\frac{7!}{4!2!}\right)\binom{8}{4}$

5. $2^n - 2^{n-1}\binom{n}{1} + 2^{n-2}\binom{n}{2} - \cdots + (-1)^{n-1}2\binom{n}{n-1} + (-1)^n$
   $= \Sigma_{k=0}^{n}(-1)^k 2^{n-k}\binom{n}{k}$
   $= (2 + (-1))^n = 1^n = 1$

6. (a) 3^7
   (b) $\binom{7}{4} + \binom{7}{2}\binom{5}{1} + \binom{7}{2}$

7. (a) $P(80, 10) = 80!/70!$
   (b) $\binom{10+(4-1)}{10} = \binom{13}{10}$
   (c) $\binom{6+(4-1)}{6} = \binom{9}{6}$

8. (a) $\binom{30}{4}$
   (b) $\binom{30}{4} - \binom{15}{4}$
   (c) $(10 \cdot 15 \cdot 5 \cdot 27)/2$

9. (a) $7!$
   (b) $7! - 2 \cdot 6! = 5 \cdot 6!$
   (c) $3! \cdot 2^4$