Martin Skatvedt, Øving 8

1) a) $8+5=\underline{\underline{13}}$

b) $8\cdot 5=\underline{\underline{40}}$

2) a) $4\cdot 12\cdot 3\cdot 2=\underline{\underline{288}}$

b) $4\cdot 1\cdot 3\cdot 2=\underline{\underline{24}}$

3)

a) $14\cdot 12=\underline{\underline{168}}$

b) $14\cdot 12\cdot 6\cdot 18=\underline{\underline{18144}}$

c) $8\cdot 18\cdot 6\cdot 3\cdot (14\cdot 12)^2=\underline{\underline{73\ 156\ 608}}$

4) 8 letters $=8!=\underline{\underline{40320}}$

5) $P(n,r)=\dfrac{n!}{(n-r)!}$

a) $P(7,2)=\dfrac{7!}{5!}=7\cdot 6=\underline{\underline{42}}$

b) $P(8,4)=\dfrac{8!}{4!}=8\cdot 7\cdot 6\cdot 5=\underline{\underline{1680}}$

c) $P(10,7)=\dfrac{10!}{3!}=10\cdot 9\cdot 8\cdot 7\cdot 6\cdot 5\cdot 4=\underline{\underline{604\ 800}}$

d) $P(12,3)=\dfrac{12!}{9!}=12\cdot 11\cdot 10=\underline{\underline{1320}}$

6) a) $C(10,4)=\dfrac{10!}{6!\,4!}=\dfrac{10\cdot 9\cdot 8\cdot 7}{4\cdot 3\cdot 2\cdot 1}=\dfrac{5040}{24}=\underline{\underline{210}}$

b) $C(12,7)=\dfrac{12!}{5!\,7!}=\dfrac{12\cdot 11\cdot 10\cdot 9\cdot 8}{5\cdot 4\cdot 3\cdot 2\cdot 1}=\dfrac{95040}{120}=\underline{\underline{792}}$

c) $C(14,12)=\dfrac{14!}{2!\,12!}=\dfrac{14\cdot 13}{2\cdot 1}=\dfrac{182}{2}=\underline{\underline{91}}$

d) $C(15,10)=\dfrac{15!}{5!\,10!}=\dfrac{15\cdot 14\cdot 13\cdot 12\cdot 11}{5\cdot 4\cdot 3\cdot 2\cdot 1}=\dfrac{360360}{120}=\underline{\underline{3003}}$

7) a) $7! = \underline{\underline{5040}}$

b) $4! \cdot 3! = 24 \cdot 6 = \underline{\underline{144}}$

c) $5! \cdot 3! = 120 \cdot 6 = \underline{\underline{720}}$

d) $2! \cdot 3! \cdot 4! = 2 \cdot 6 \cdot 24 = \underline{\underline{288}}$

8) a) $C(20,12) = \frac{20!}{8!\,12!} = \frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16 \cdot 15 \cdot 14 \cdot 13}{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \underline{\underline{125\,970}}$

b) $C(10,6) \cdot C(10,6) = \left(\frac{10!}{4!\,6!}\right)^2 = \left(\frac{10 \cdot 9 \cdot 8 \cdot 7}{4 \cdot 3 \cdot 2 \cdot 1}\right)^2 = \underline{\underline{44100}}$

c) $\binom{10}{2} \cdot \binom{10}{10} + \binom{10}{4} \cdot \binom{10}{8} + \binom{10}{6} \cdot \binom{10}{6} + \binom{10}{8} \cdot \binom{10}{4} +$
$\binom{10}{10} \cdot \binom{10}{2} = \underline{\underline{63090}}$

d) $\binom{10}{8} \cdot \binom{10}{4} + \binom{10}{9} \cdot \binom{10}{3} + \binom{10}{10} \cdot \binom{10}{2}$
$= \underline{\underline{10695}}$

9) 1, 3, 3, 7, 7, 8

- 1, 3, 7, 8 $\quad 4! = \underline{24}$

3, 3, x, y : $x \neq y$
since x has three posibilites (1, 7, 8)
and y has two (since $x \neq y$)
$P(3,2) = \frac{3!}{1!} = 6$ Ther are 6 ways they
can be placed. Therefore: $6 \cdot 6 = \underline{36}$

- 7, 7, z, w same as above $6 \cdot 6 = \underline{36}$

- 3, 3, 7, 7 $C(4,2) = \frac{4!}{2!\,2!} = \frac{4 \cdot 3}{2} = \underline{6}$

n combinations $= 24 + 36 + 36 + 6 = \underline{\underline{102}}$

10) $x^9 y^3$ $\quad (a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$

a) $\underline{\underline{(a+b)^{12} = \binom{12}{9}}}$

b) $\underline{\underline{(a+2b)^{12} = \binom{12}{9} 2^3}}$

c) $\underline{\underline{(2x-3y)^8 = 2^9 (-3)^3 \binom{12}{9}}}$