METU Mathematics Department
MATH 112: Answers to Exercise Set 1

1.
   - $\frac{8!}{3!}$
   - $6!$
   - $\frac{6!}{2!} \cdot \binom{7}{1} \cdot \binom{3}{2} \cdot 2! \cdot \binom{6}{1}$

2. 600000

3. (a) $11!$
   (b) $10! \cdot 2!$
   (c) $8! \cdot 9 \cdot 8 \cdot 7$

4. (a)
   - $64 \cdot 49$
   - $64 \cdot 49 \cdot 36 \cdot 25$

   (b) $\frac{14!}{7! \cdot 7!}$

5. $(2n-1) \cdot (2n-3) \cdots 5 \cdot 3 \cdot 1$

6. (a) $\binom{100}{12}$
   (b) $\binom{40}{6} \cdot \binom{60}{6}$
   (c) $\binom{40}{9} \cdot \binom{60}{3}$

7. (a) $\binom{4}{1} \cdot \binom{13}{5}$
   (b) $\binom{13}{1} \cdot \binom{48}{1}$
   (c) $\binom{13}{1} \cdot \binom{4}{3} \cdot \binom{48}{1} \cdot \binom{44}{1}$. We do not want a full house or a four of a kind.
   (d) $\binom{13}{1} \cdot \binom{4}{3} \cdot \binom{12}{1} \cdot \binom{4}{2}$
   (e) $\binom{13}{2} \cdot \binom{4}{2} \cdot \binom{4}{2} \cdot \binom{44}{1}$. We do not want a full house or a four of a kind.

8. (a) $\frac{10!}{1! \cdot 2! \cdot 3! \cdot 4!}$
   (b) $2 \cdot 3^3 \cdot (-2)^6 \cdot \frac{12!}{1! \cdot 2! \cdot 3! \cdot 0! \cdot 6!}$
   (c) $(-3) \cdot (-2)^3 \cdot 3^7 \cdot \frac{12!}{0! \cdot 1! \cdot 1! \cdot 3! \cdot 0! \cdot 7!}$.