MAT1830 - Discrete Mathematics for Computer Science
Assignment #9
To be handed in at the beginning of your support class in week 11 (15 – 19 May)

Fully explain your answers for all questions.

1. A biased coin flips heads with probability $\frac{3}{7}$ and tails with probability $\frac{4}{7}$. The coin is flipped 80 times. What is the probability that heads is flipped exactly 30 times?

2. Cars pass through a road junction according to a Poisson distribution. An average of 7 cars per minute pass through the junction.
   (a) What is the probability that exactly one car passes through the junction in a certain minute?
   (b) What is the expected number of cars to pass through in three minutes?
   (c) What is the probability that exactly the expected number from (b) pass through in a certain three minute period?

3. A random variable Y can only take values in $\{-10, 0, 10\}$. The expected value of Y is 0 and its variance is 80. Find the probability distribution of Y.

4. Write down the first five values of each of the following recursive sequences.
   (a) $r_0 = 2, \qquad r_n = (r_{n-1})^2 - n - 1 \quad$ for all integers $n \geq 1$.
   (b) $s_0 = 2, \qquad s_n = (s_{n-1})^2 + (s_{n-2})^2 + \cdots + (s_0)^2 \quad$ for all integers $n \geq 1$.