Assignment 2 – ELEC ENG 3TQ3
Due Date Nov 14h 8:30 a.m.

1. (6 points) Assume that the life cycle of the light bulb is a function of the power. Let the expected life be exponentially distributed variable such that 60W bulb has expected life of 2000 hours and 120W has expected life of 1200 hours. Consider a long hallway in which we have one 60W bulb and one 120W bulb replaced at the same time. Also assume that their lifetimes are independent. a) Find the probability that after 1 month we will have at least one functioning bulb in the hallway. b) Find the probability that we will not have to change bulbs for at least 1 year.

2. (7 points) Consider two random variables X and Y with join pdf such that

$$f_{X,Y}(x,y) = \begin{cases} cx^2y & when\ 0 \le x \le y \le 2 \\ 0 \end{cases}$$

   a) Find c.
   b) Find marginal distributions of X and Y.
   c) Find conditional distributions
   d) Are x and y independent justify your answer.

3. (7 points) John is going out on Saturday evening and meeting with his date Susan in downtown at 8:00 p.m. John decides to take the bus and his arrival time is uniformly distributed in the range of (7:55 p.m., 8:10 p.m.). Susan decides to to take the subway and her arrival time is exponential distributed with $\lambda = 0.5\ min^{-1}$. Find the probability Susan arrives before John.