You can use the Tables of the Poisson distribution or R to compute the numerical solution of the problems below. Please recall the commands associated with the Poisson pmf

dpois(x, lambda): \( P(X = x) \) for \( X \sim \text{Poisson}(\lambda) \)

ppois(q, lambda): \( P(X \leq q) \) for \( X \sim \text{Poisson}(\lambda) \)

(1)[3 Pts] On average, 2.5 telephone calls per minute are received at the UH's switchboard. Assuming that the number of incoming calls per minute follows a Poisson distribution, compute the probability that at any given minute there will be more than 2 calls.

(2)[3 Pts] Suppose that in one year the number of industrial accidents \( X \) follows a Poisson distribution with mean 3.0. If each accident leads to an insurance claim of $5,000, how much money would an insurance company need to keep in reserve to be 95% certain that the claims are covered?

(3)[4 Pts] A delivery company found that the number of complaints was six per years on average. Assuming that the number of complaints follows a Poisson distribution, calculate the probability of having no complaints in

(a) all of next year;
(b) the next quarter.

(4)[6 Pts] Let \( X \) and \( Y \) have the following joint p.d.f.

<table>
<thead>
<tr>
<th>( y )</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.05</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>2</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>3</td>
<td>0.15</td>
<td>0.15</td>
<td>0.05</td>
</tr>
</tbody>
</table>

(a) Calculate the marginal densities. Are \( X \) and \( Y \) independent?
(b) Compute the means and variances.
(c) Are \( X \) and \( Y \) positively correlated? negatively correlated? uncorrelated?

(5)[4 Pts] Let \( W = 1 - X + 2Y \) be a discrete random variable where \( X \), \( Y \) are independent discrete random variables with \( \mu_X = 5 \), \( \mu_Y = 2 \), and \( \sigma^2_X = 2 \), \( \sigma^2_Y = 1 \). Compute \( \mu_W \) and \( \sigma^2_W \).