Assignment

1. If A, B and C have chances of being selected as a manager at a private firm it is in the ratio 4:1:2. The chances for them to introduce changes in marketing strategies are 0.3, 0.8 and 0.5, respectively. If a change has taken place, find the probability that it is due to the selection of B.

```python
# Given probabilities
prob_selection = [4, 1, 2]  # Probabilities of A, B, and C being selected
prob_changes = [0.3, 0.8, 0.5]  # Probabilities of introducing changes for A, B, and C

# Calculate the sum of probabilities for normalization
total_prob_selection = sum(prob_selection)
total_prob_changes = sum(prob_changes)

# Normalize probabilities
normalized_prob_selection = [prob / total_prob_selection for prob in prob_selection]
normalized_prob_changes = [prob / total_prob_changes for prob in prob_changes]

# Calculate the probability of a change being due to the selection of B using Bayes' theorem
index_b = 1  # Index for manager B
prob_b_given_change = normalized_prob_selection[index_b] * normalized_prob_changes[index_b]
prob_change = sum([
    normalized_prob_selection[i] * normalized_prob_changes[i]
    for i in range(len(normalized_prob_selection))
])

probability_due_to_b = prob_b_given_change / prob_change

print("Probability that a change is due to the selection of B:", probability_due_to_b)
```

```
Probability that a change is due to the selection of B: 0.2666666666666667
```

2. A man speaks the truth 4 out of 5 times. He throws a die and reports that it is actually a six. Find the probability that it is actually a six.

```python
# Given probabilities
prob_truthful = 4 / 5  # Probability of speaking the truth
prob_lie = 1 - prob_truthful  # Probability of lying
prob_six_given_truth = 1 / 6  # Probability of rolling a six given that the person is telling the truth
prob_six_given_lie = 0  # Probability of rolling a six given that the person is lying

# Calculate the probability that the person reports a six
# P(reporting a six) = P(reporting a six | telling truth) * P(telling truth) + P(reporting a six | lying) * P(lying)
prob_report_six = (prob_six_given_truth * prob_truthful) + (prob_six_given_lie * prob_lie)

# Calculate the probability that it is actually a six given that the person reported a six using Bayes' theorem
prob_six_given_report_six = (prob_six_given_truth * prob_truthful) / prob_report_six

print("Probability that it is actually a six given that the person reported a six:", prob_six_given_report_six)
```

```
Probability that it is actually a six given that the person reported a six: 1.0
```

3. A sack contains 4 balls. Two balls are drawn at random (without replacement) and are found to be red. What is the probability that all balls in the bag are red?

```
[3]  # Probability that all balls are red (A)
     prob_all_red = 1

     # Probability of drawing two red balls (B)
     # First draw: 4 red balls out of 4
     prob_first_red = 4 / 4
     # Second draw: 3 red balls out of 3 remaining
     prob_second_red = 3 / 3
     # Total probability of drawing two red balls
     prob_two_red = prob_first_red * prob_second_red

     # Calculate the conditional probability P(A | B)
     prob_all_red_given_two_red = prob_all_red / prob_two_red

     print("Probability that all balls are red given that two red balls are drawn:", prob_all_red_given_two_red)

     Probability that all balls are red given that two red balls are drawn: 1.0
```