Unit XXVI Assignment II

Nathan Windisch

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Contents

1 Sequences and Series

The following are answers to questions set for the first task.

1.1 nth and 17th Terms

Find a formula for the NTH term of this sequence and find the 17TH term using your NTH term formula. Also calculate the **sum of the first 17 terms of this sequence**.

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Sequence:  -3, 1, 5, 9, 13 ...
Formula:  4n-3 as the diffence between all the numbers is 4 and the sequence starts at -3
1n..17n = -3, 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61
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1.2 Sums to Terms and Infinity

Find a formula for the NTH term of this sequence and find the 10TH term using your NTH term formula. Also calculate the **sum to the 5th term** and the **sum to infinity** of this sequence.

1.2.1 nth Term

`81, -27, 9, -3 ...  = Xn+/-Y Xn+/-Y 15n = n =`

1.2.2 10th Term

`things`

1.2.3 Sum to 5th Term

`things`

1.2.4 Sum to Infinity

`things`

1.3 Equations

Find the solution to

$$\sum_{r=1}^{6}(3r - 2r^2 + r^3)$$

Substituting the Rs for 1s.

$$\sum_{r=1}^{6}((3 \times 1) - (2 \times 1^2) + (1^3))$$

Substituting the Rs for 2s.

$$\sum_{r=2}^{6}((3 \times 2) - (2 \times 2^2) + (2^3))$$

Substituting the Rs for 3s.

$$\sum_{r=3}^{6}((3 \times 3) - (2 \times 3^2) + (3^3))$$

Substituting the Rs for 4s.

$$\sum_{r=4}^{6}((3 \times 4) - (2 \times 4^2) + (4^3))$$

Substituting the Rs for 5s.

$$\sum_{r=5}^{6}((3 \times 5) - (2 \times 5^2) + (5^3))$$

Substituting the Rs for 6s.

$$\sum_{r=6}^{6}((3 \times 6) - (2 \times 6^2) + (6^3))$$

Working out the brackets where R = 1.

$$\sum_{r=1}^{6}(3-(2\times 1)+1)$$

Working out the brackets where R = 2.

$$\sum_{r=2}^{6}(6-(2\times 4)+8)$$

Working out the brackets where R = 3.

$$\sum_{r=3}^{6}(9-(2\times 9)+27)$$

Working out the brackets where R = 4.

$$\sum_{r=4}^{6}(12-(2\times 16)+64)$$

Working out the brackets where R = 5.

$$\sum_{r=5}^{6}(15-(2\times 25)+125)$$

Working out the brackets where R = 6.

$$\sum_{r=6}^{6}(18-(2\times 36)+216)$$

Final solution within the brackets where R = 1.

$$\sum_{r=1}^{6}(3-2+1)$$

Final solution within the brackets where R = 2.

$$\sum_{r=2}^{6}(6-8+8)$$

Final solution within the brackets where R = 3.

$$\sum_{r=3}^{6}(9-18+27)$$

Final solution within the brackets where R = 4.

$$\sum_{r=4}^{6}(12-32+64)$$

Final solution within the brackets where R = 5.

$$\sum_{r=5}^{6}(15-50+125)$$

Final solution within the brackets where R = 6.

$$\sum_{r=6}^{6}(18-72+216)$$

Final solution without the brackets where R = 1.

$$\sum_{r=1}^{6}(2)$$

Final solution without the brackets where R = 2.

$$\sum_{r=2}^{6}(6)$$

Final solution without the brackets where R = 3.

$$\sum_{r=3}^{6}(18)$$

Final solution without the brackets where R = 4.

$$\sum_{r=4}^{6}(44)$$

Final solution without the brackets where R = 5.

$$\sum_{r=5}^{6}(90)$$

Final solution without the brackets where R = 6.

$$\sum_{r=6}^{6}(162)$$

Therefore we need to add up all the numbers to get the final figure.

$$\sum(2 + 6 + 18 + 44 + 90 + 162)$$

This means that the final answer is:

$$322$$

1.4 Balls in Bags

Five balls are in a bag, 3 are red and 2 are yellow. Once a ball is chosen at random the ball is put back into the bag and the bag is shaken well.

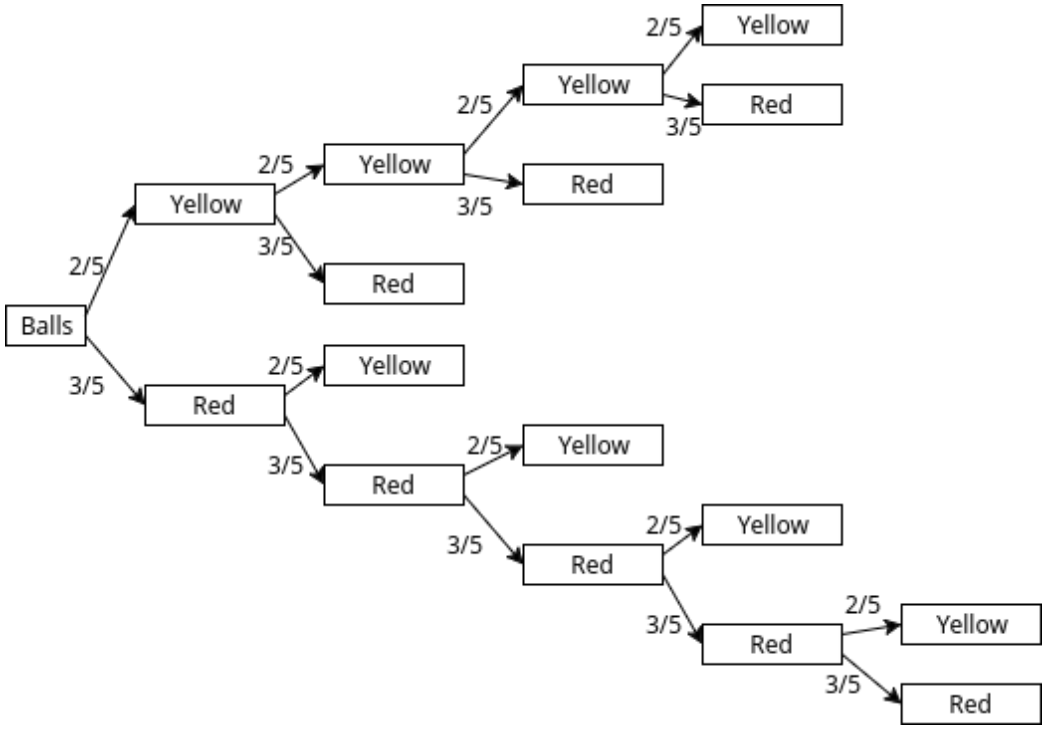


Figure 1: Probability Table.

1.4.1 What is the probability that a yellow ball is selected?

The answer to the first question is

$$\frac{2}{5}$$

This is because there is a total of five balls in the bag, and two of those are yellow meaning that there is a two in five chance of ever getting a yellow ball.

1.4.2 What is the probability 2 yellow balls are selected consecutively?

The answer to the second question is

$$\frac{4}{10}$$

This is because there can be a maximum of 2 balls taken out if the answer is correct, and they both need to be yellow. Because of this, the chance of getting the first ball is two in five, as is the second.

1.4.3 Draw a probability tree and use it to find the probability that a yellow ball is selected 4 times in a row.

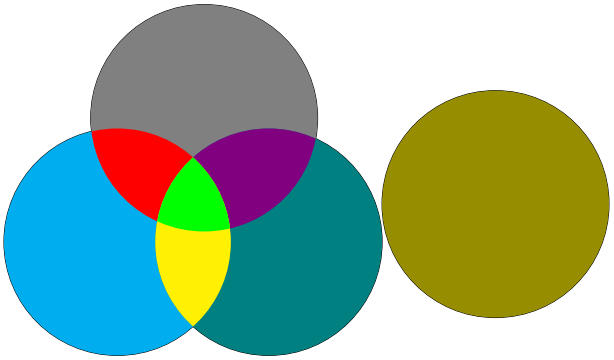
The answer to the third question is

$$\frac{16}{625}$$

This is because 2 x 2 x 2 x 2 is 16 and 5 x 5 x 5 x 5 is 625. We multiply these numbers as the probabibility of getting one Yellow is two out of five, so therefore we need to multiply it by itself four times as we want to get the total value of all four balls being yellow.

1.5 Venn Diagrams

1.5.1 The Diagram



In this Venn diagram, the:

1. Cyan part is for the students that only take Computer Science.
    - This number is 70 students.
2. Gray part is for the students that only take Engineering.
    - This number is 83 students.
3. Teal part is for the students that only take Mathematics.
    - This number is 0 students.
4. Olive part is for the students that take none of the above.
    - This number is 10 students.
5. Yellow part is for the students that take both Computer Science and Mathematics.
    - This number is 15 students.
6. Violet part is for the students that take both Engineering and Mathematics.
    - This number is 12 students.
7. Red part is for the students that take both Computer Science and Engineering.
    - This number is 0 students.

8. Green part is for the students that take all the subjects, Computer Science, Engineering and Mathematics.
    - This number is 0 students.

1.5.2 Probability: Computer Science but not Mathematics

The total number of all of these students is

$$70 + 83 + 0 + 10 + 15 + 12 + 0 + 0 = 190$$

This means that the probability of a random Computer Science student that does not take Mathematics is

$$\frac{70}{190}$$

Which, similifed is:

$$\frac{35}{95}$$

And similfying it even more makes:

$$\frac{7}{19}$$

1.5.3 Probability: Engineering with or without other subjects

he total number of all of these students is:

$$70 + 83 + 0 + 10 + 15 + 12 + 0 + 0 = 190$$

This means that the probability of a random Engineering student that either does or does not take another subject is:

$$\frac{83 + 12}{190}$$

Which, similifed is:

$$\frac{95}{190}$$

And similfying it even more makes:

$$\frac{1}{2}$$

1.6 Betting Game

A betting game involves 1 player throwing a 6 sided die to represent an attack and the other player throwing a 4 sided die to represent a defence. Draw a probability space diagram for this game. What is the most likely total score(s) from both dice? What is the least likely score(s) and why?