Grade 11 Math Methods Lesson 2

Question 8 (5 marks)

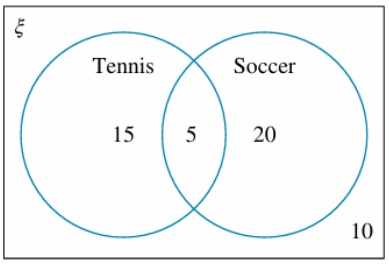
Consider the equation of the circle $x^2 + y^2 - 4x + 2y - 4 = 0$.

a. Determine the centre and the radius of the circle.

b. Hence, calculate the area of the circle (in terms of π).

Question 5 (3 marks)

Fifty students at a sports camp were asked what sport they represented their school in. The results are shown in the Venn diagram.



a. Calculate the probability that a student chosen at random:

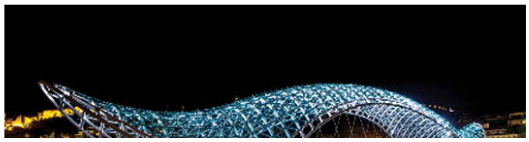
   i. represents the school in soccer

   ii. represents the school in tennis but not in soccer.

b. Calculate the probability that a student represents the school in tennis, given that they represent the school in soccer.

Simple familiar

1. Factorise $P(x) = x^3 + 5x^2 + 3x - 9$ into linear factors.
2. Given $(x - 2)$ and $(x + 1)$ are factors of $P(x) = 6x^4 - 17x^3 - 11x^2 + 32x + 20$, determine all the linear factors of this polynomial.
3. The polynomial $P(x) = x^3 - ax^2 + bx - 3$ leaves a remainder of 2 when it is divided by $(x - 1)$ and a remainder of -4 when it is divided by $(x + 1)$. Calculate the values of a and b.



10. Given $\mathrm{P}(A) = 0.7, \mathrm{P}(B) = 0.3$ and $\mathrm{P}(A \cup B) = 0.8$, find the following.

a. $\mathrm{P}(A \cap B)$ **b.** $\mathrm{P}(A|B)$ **c.** $\mathrm{P}(B|A)$ **d.** $\mathrm{P}(A|B')$

11. Given $\mathrm{P}(A) = 0.6, \mathrm{P}(B) = 0.5$ and $\mathrm{P}(A \cup B) = 0.8$, find the following.

a. $\mathrm{P}(A \cap B)$ **b.** $\mathrm{P}(A|B)$ **c.** $\mathrm{P}(B|A)$ **d.** $\mathrm{P}(A|B')$

12. Given $\mathrm{P}(A) = 0.6$, $\mathrm{P}(B) = 0.7$ and $\mathrm{P}(A \cap B) = 0.4$, find the following.

a. $\mathrm{P}(A \cup B)$ **b.** $\mathrm{P}(A|B)$ **c.** $\mathrm{P}\left(B|A'\right)$ **d.** $\mathrm{P}(A'|B')$

Tech active

15. The revenue $(\$)$ from the sale of x thousand items is given by $R(x) = 6(2x^2 + 10x + 3)$ and the manufacturing cost ($) of x thousand items is $C(x) = x(6x^2 - x + 1)$.

- **a.** State the degree of $R(x)$ and of $C(x)$.
- **b.** Calculate the revenue and the cost if 1000 items are sold and explain whether a profit is made.
- **c.** Show that the profit ($) from the sale of x thousand items is given by $P(x) = -6x^3 + 13x^2 + 59x + 18$.
- **d.** Given the graph of $y = -6x^3 + 13x^2 + 59x + 18$ cuts the x-axis at $x = -2$, sketch the graph of $y = P(x)$ for appropriate values of x.
- **e.** If a loss occurs when the number of items manufactured is d, state the smallest value of d.

Part C: Complex unfamiliar — total marks: 10

Question 9 (10 marks)

A cuboid container with a base length twice its width is to be made with $48\,m^2$ of metal. Let x represent the container's width and h represent the container's height.

a. Describe how the volume of the container changes as x changes.

b. Determine the dimensions of the container with the largest volume

c. Calculate the maximum volume.

Use mathematical reasoning to justify your response.