C2 notes

Algebraic and Functions

Factor Theorem

- $Show\ that\ x-1\ is\ a\ factor\ of\ 2x^3-3x^2-x+2$
  - $Reaarange\ x-1\ to\ find\ x, x=1$
  - $Sub\ x\ into\ the\ equation\ [2(1)^3-3(1)^2-1+2]$
  - $If\ equation\ equals\ to\ 0\ then\ x-1\ is\ a\ factor$
  - $[2(1)^3-3(1)^2-1+2]=0\ \therefore x-1\ is\ a\ factor$

Long Division

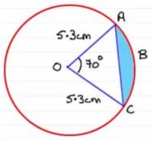
- $Find\ the\ solutions\ of\ 2x^3-3x^2-x+2$
  - $x-1\ is\ a\ factor\ \therefore divide\ equation\ by\ x-1$
  - $$\begin{array}{r|l} & 2x^2-x-2 \\ \hline x-1 & 2x^3-3x^2-x+2 \\ - & \underline{2x^3-2x^2} \\ & \quad x^2-x \\ - & \quad \underline{x^2+x} \\ & \quad\quad -2x+2 \\ - & \quad\quad \underline{-2x+2} \\ & \quad\quad\quad 0 \end{array}$$
    - Divide the highest term in the equation ($2x^3$) by the highest term in the factor (x)
    - Multiply the answer ($2x^2$) the factor
    - Subtract the answer from the 2 highest term in the equation ($[2x^3-3x^2]-[2x^3-2x^2]$)
    - The highest terms should cancel out
    - Bring down the next term
    - Repeat steps from the start until you are left with a remainder or 0
  - $2x^3-3x^2-x+2$ dived by $x-1$ has 0 has a remainder so $x-1$ is one of the solutions of the equation, the other 2 can be found by factorising the quadratic equation got from long division ($2x^2-x-2$))
  - Solutions are $\frac{1+\sqrt{17}}{4}, \frac{1-\sqrt{17}}{4}$ $and\ x-1$ – using the quadratic formula $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$
    - If the equation has missing terms for example $3x^4 - 2x^2+4$, simply rewrite and put 0 for the co-efficient of the missing x terms and use long division to find solutions; so $3x^4 - 2x^2+4 = 3x^4-0x^3+2x^2+0x+4$

Exponentials

- Exponential functions : $y=a^x$

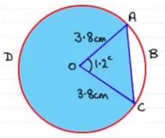
- $Area = \frac{142}{360} \times \pi 6^2 = 44.6cm^2$
- $Perimeter = \left(\frac{142}{360} \times 2\pi 6\right) + (6+6) = 14.9 + 12 = 26.9cm$

○ *Find the area of the minor segment (shaded below), giving your answer to 1 dp*



- $Area\ of\ sector - Area\ of\ triangle = Area\ of\ segment$
- $Area\ of\ sector = \frac{70}{360} \times \pi 5.3^2 = 17.2cm^2$
- $Area\ of\ triangle = \frac{1}{2}(5.3 \times 5.3)\sin 1.2 \quad = 13.2cm^2$
- $Area\ of\ segment = 17.2 - 13.2 = 4.0cm^2$

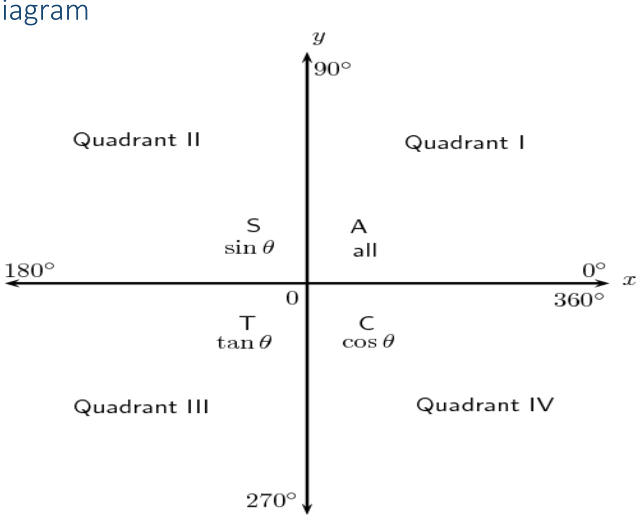
○ *Find the area of the major segment (shown below), giving your answer to 1 dp.*



- $Area\ of\ major\ segment = Area\ of\ circle - Area\ of\ minor\ segment$
- $Area\ of\ circle = \pi 3.8^2 = 45.36cm^2$
- $Area\ of\ minor\ segment = \ Area\ of\ sector - Area\ of\ triangle$
- $Area\ of\ sector = \frac{1.2}{2\pi} \times \pi 3.8^2 = 8.66cm^2$
- $Area\ of\ triangle = \frac{1}{2}(3.8 \times 3.8)\sin 1.2^c = 6.72cm^2$
- $Area\ of\ minor\ segment = 8.66cm^2 - 6.72cm^2 = 1.94cm^2$
- $Area\ of\ major\ segment = 45.36cm^2 - 1.94cm^2 = 43.4cm^2$

Trigonometry Equations

CAST Diagram



- Quadrant 1 – All are positive, Quadrant 2 – Sine is positive, Quadrant 3 – Tangent is positive, Quadrant 4 – Cosine is positive

General Solutions of Trigonometric Equations

- $For\ \sin\theta = S\ (where\ |S|\ is\ \leq 1), the\ general\ solution\ is$