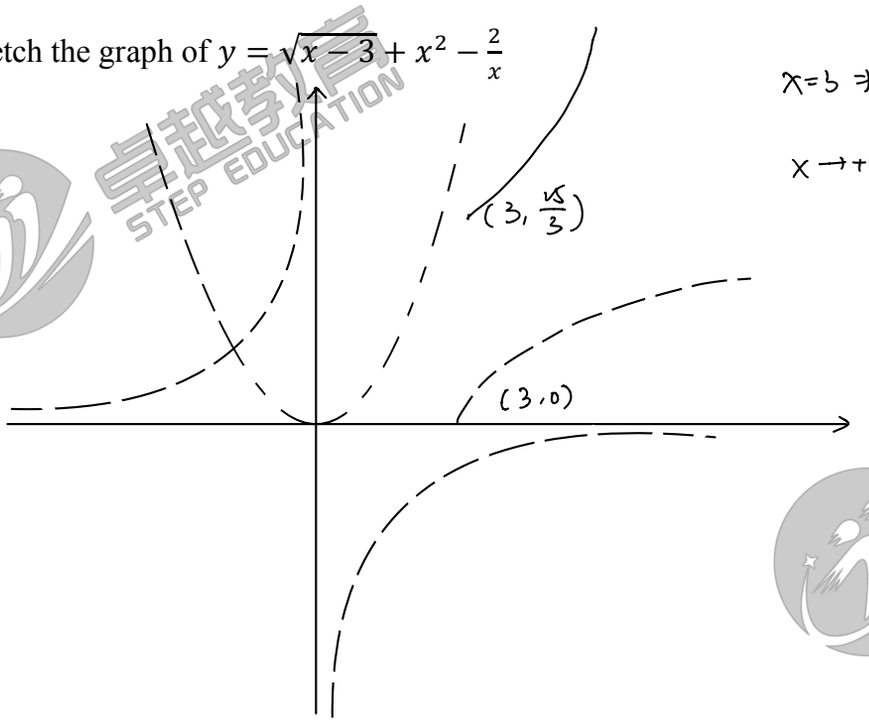
Specialist Maths Unit 3/4 Practice Questions

Graphing Techniques Advance Practice

Question 1

Sketch the graph of $y = \sqrt{x-3} + x^2 - \frac{2}{x}$ 3 mark



Question 2

For $x_1 = 2\sin t, y_1 = 2\cos t, t \in (0, \pi)$

$x_2 = \tan(r), y_2 = \sec(r), r \in \left(\frac{-\pi}{2}, 0\right)$

Sketch the two graphs on the same axes, pay attention to the domain implied. 4 mark

$\sin t = \frac{x}{2}$

$\cos t = \frac{y}{2}$

$\therefore \left(\frac{x}{2}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$

$\frac{x^2}{4} + \frac{y^2}{4} = 1$

$\therefore x^2 + y^2 = 4$

$\because t \in (0, \pi)$

$2\sin t \in (0, 2)$

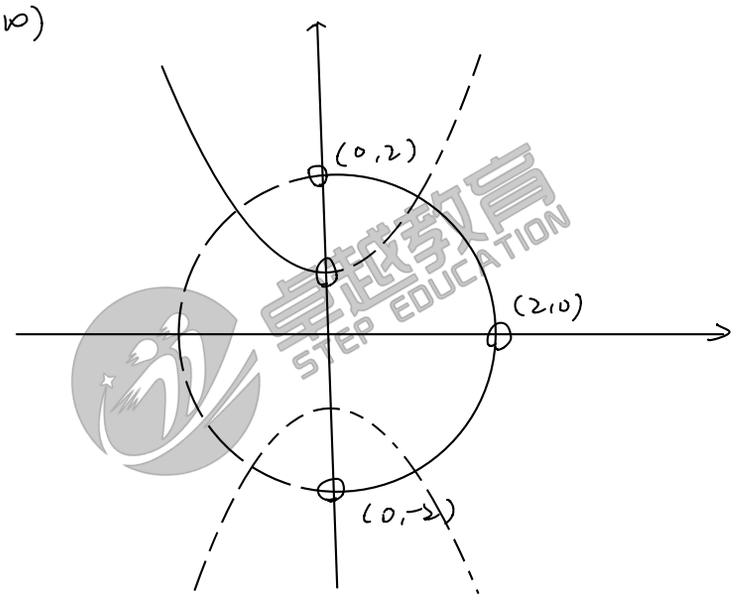
$2\cos t \in (-2, 2)$

$\sec(r) \in (1, +\infty)$

$y_2 - x_2 = 1$

$\because r \in (-\frac{\pi}{2}, 0)$

$\tan r \in (-\infty, 0)$

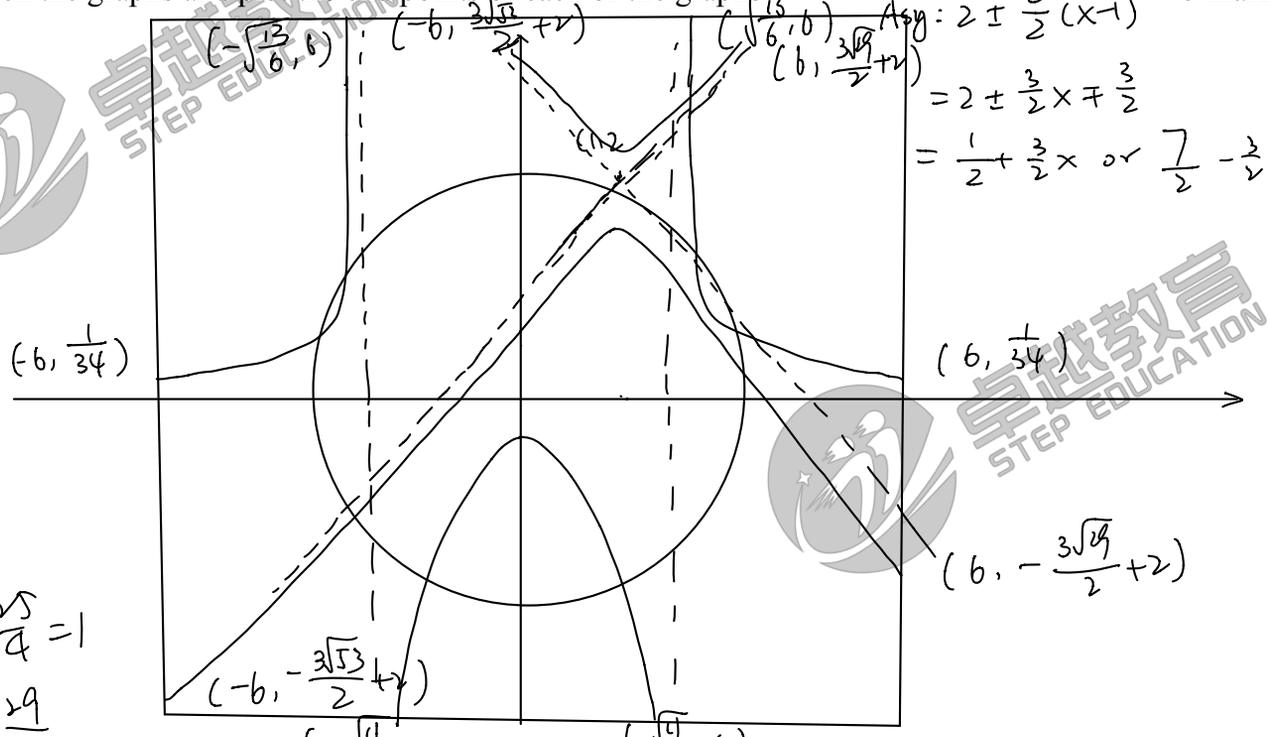


Question 3

Abby is thinking of cutting paper for decoration. She designed a model combining function

$f(x)=\frac{1}{x^2-2}$, relation $x^2+y^2=4$ and $\frac{(y-2)^2}{9}-\frac{(x-1)^2}{4}=1$

She wants to make sure the graphs shown are restricted in a 6×6 square for paper-cutting purpose, sketch the graphs and plot the end points of each of the graphs. 5 mark



Asy: $2\pm\frac{3}{2}(x-1)$

$=2\pm\frac{3}{2}x\mp\frac{3}{2}$

$=\frac{1}{2}+\frac{3}{2}x$ or $\frac{7}{2}-\frac{3}{2}x$

when $x=6$

$\frac{(y-2)^2}{9}-\frac{25}{4}=1$

$\frac{(y-2)^2}{9}=\frac{29}{4}$

$(y-2)^2=\frac{29\times 9}{4}$

$y-2=\frac{3\sqrt{29}}{2}$

$y=\pm\frac{3\sqrt{29}}{2}+2$

$x=-6$

$\frac{(y-2)^2}{9}=\frac{53}{4}$

$(y-2)^2=9\cdot\frac{53}{4}$

$y-2=\pm\frac{3\sqrt{53}}{2}$

when $y=6$

$\frac{1}{x^2-2}=6$

$x^2-2=\frac{1}{6}$

$x^2=\frac{13}{6}$

$x=\pm\sqrt{\frac{13}{6}}$

when $y=-6$.

$\frac{1}{x^2-2}=-6$

$x^2-2=-\frac{1}{6}$

$x^2=\frac{11}{6}$

$x=\pm\sqrt{\frac{11}{6}}$