

5 (a) Solve the inequality  $2(x - 1) \leq 6x^2 - 30$ . [3]

(b) A curve has the equation  $y = 4x^2 - 2kx + k$ , where  $k$  is a constant.  
Find the range of values of  $k$  for which the curve lies completely above the  $x$ -axis. [4]

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$$\begin{aligned} \text{a) } 2(x-1) &\leq 6x^2 - 30 && \text{- Swap} \\ 6x^2 - 2x - 30 + 2 &\geq 0 && \text{- Factorise} \\ (x+2)(3x-7) &\geq 0 \end{aligned}$$

Testing Regions,



$$x \leq -2 \text{ or } x \geq \frac{7}{3} \quad \parallel \quad \text{Ans}$$

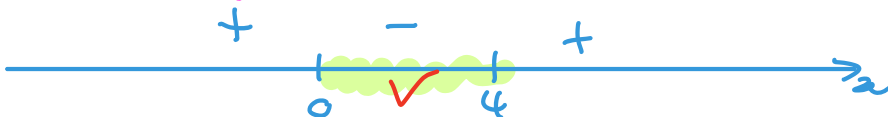
b)  $y = 4x^2 - 2kx + k$

$$D < 0$$

$$(-2k)^2 - 4(4)(k) < 0$$

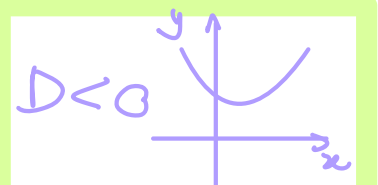
$$4k(k-4) < 0$$

Testing Regions



$$0 < k < 4 \quad \parallel \quad \text{Ans}$$

Hint:



$$D = b^2 - 4ac$$