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Year 2 (A-Level)

Functions Set 1

The marks shown are for guidance purposes only

When not specified, round all non-terminating decimals to 3 significant figures where applicable

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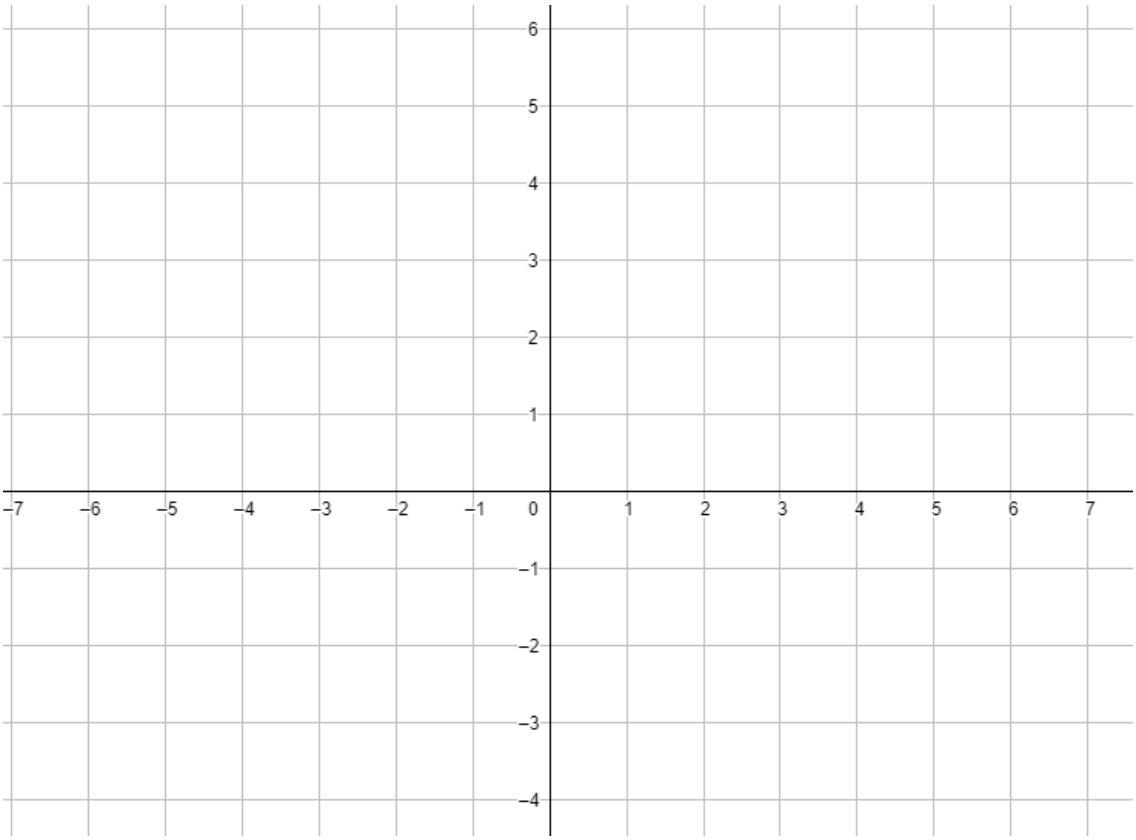
1 Sketch the graph of $y = \frac{1}{x-3} + 5;\ x \neq 3$



Write down the equations of the vertical and horizontal asymptotes and indicate the point where they intersect

[5marks]

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2 A function f(x) is defined on a set of real numbers as

$$f(x) = 4x^2 - 5x + 20$$

a) Show that a possible expression for $f^{-1}(x)$ is $\frac{5+\sqrt{16x-295}}{8}$ **[3marks]**

b) Another function $g(x)$ is such that $g(x) = 5 - 3x$

Find $\frac{d}{dx} f^{-1} g(x)$ **[6marks]**

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3	A function h(x) is given as $\mathrm{h}(x) = \frac{2x}{\sqrt{1-x^2}}$ a)State the values of x for which h(x) is undefined **[2marks]** b)Find $h^{-1}(x)$ and state its domain **[5marks]**

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4 Two functions f and g are defined on a set of real numbers as f: $x \rightarrow \frac{x-3}{x+4}; x \neq -4$ and $g: x \rightarrow \frac{5x}{x-3}; x \neq 3$

Find:

a) f$g^{-1}(x)$ **[5marks]**

b) The image of -2 under f$g^{-1}(x)$ **[1mark]**

c) Determine whether any of f and g is a one-to-one function **[1mark]**

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5	Given that $\mathrm{f}(x) = 11 - 5x$ a) Sketch the graph of $y = \lvert \mathrm{f}(x) \rvert$ and state its domain **[3marks]** b) Hence or otherwise solve the $\lvert \mathrm{f}(x) \rvert = \lvert 2x \rvert$ **[4marks]**

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6	The equation $\lvert k - 3x \rvert = \lvert 1 + x \rvert$ has equal roots a)Find the value of k **[4marks]** b)Hence solve the equation **[2marks]**

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