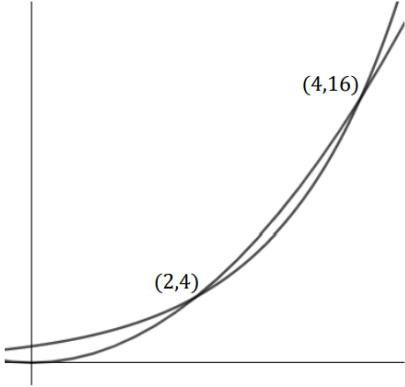
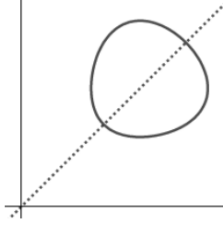


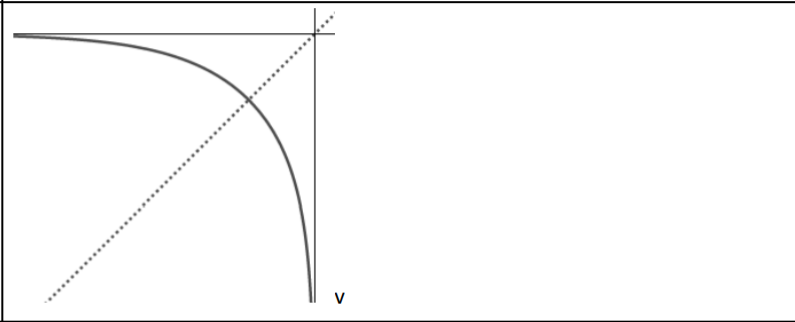
## STEP II, 2020, Q2 MS

2(i)	$\frac{1-ky}{y} \frac{dy}{dx} = \frac{kx-1}{x}$
	$\ln y  - ky = kx - \ln x  + c$
	Hence, $\ln xy  = k(x+y) + c$
	$xy = \frac{1}{4}[(x+y)^2 - (x-y)^2] = Ae^{k(x+y)}$
	$C_1$ is $(x-y)^2 = (x+y)^2 - 2^{x+y}$
	$C_2$ is $(x-y)^2 = (x+y)^2 - 2^{x+y+4}$
	In both cases, the equation is invariant under $(x, y) \mapsto (y, x)$ , so symmetrical in $y = x$ .
2(ii)	
	Graphs: Correct shapes of curves
	Graphs: Intersections at (2,4) and (4,16)
	$(x-y)^2 \geq 0$ , so $(x+y)^2 > 2^{x+y}$
	Therefore, $(x+y)$ must lie between 2 and 4
	
	Graph: Symmetry about $y = x$
	Graph: Closed curve lying between $x + y = 3 \pm 1$
	Graph: Passes through (1,1) and (2,2)



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2(iii)	Sketches of $y = x^2$ and $y = 2^{x+4}$ $x^2 > 2^{x+4}$ only when $x < -2$ .
	
	Graph: Symmetry about $y = x$
	Graph: Passes through $(-1, -1)$
	Graph: $y \rightarrow 0$ as $x \rightarrow \infty$ , $y \rightarrow -\infty$ as $x \rightarrow 0$



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