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MA302.4.E1 – Simple Graphs Exercise

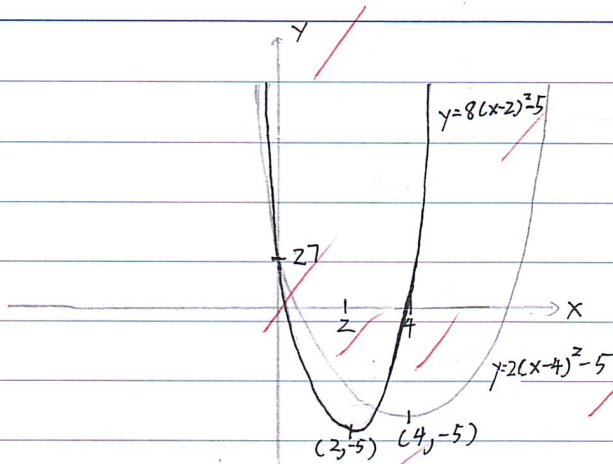
1. Sketch the graph of $y = 2(x-4)^2 - 5$. **Hence** sketch on the same axes the graph of $y = 8(x-2)^2 - 5$.
2. Sketch the graph of $y = (x+2)(x-1)^2(x-3)$. Hence sketch on the same axes $y = (x+2)(x-1)^2(6-2x)$.
3. Sketch the graphs of the following:
 - (a) $y = 6(2^x)$
 - (b) $y = \frac{2}{3x^n}$, where n is even
4. Determine the number of solutions to the following equations by graphical method.
 - (a) $3x^4 + \frac{2}{x} = 0$
 - (b) $2^x = 2x$
 - (c) $x^5 + x + 1 = 0$
 - (d) $2^x(x-1)(x+2)^2 = 10$



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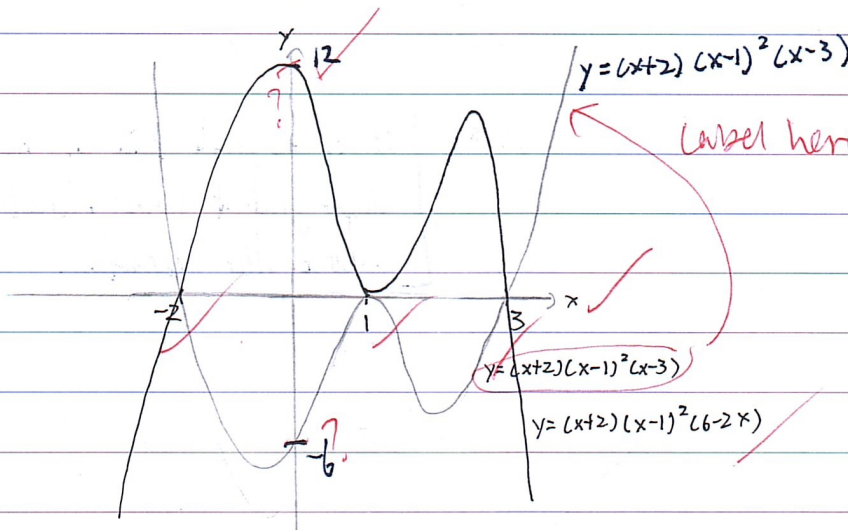
1.



Scaling factor of $\frac{1}{2}$ parallel to the x-axis
with y-axis invariant

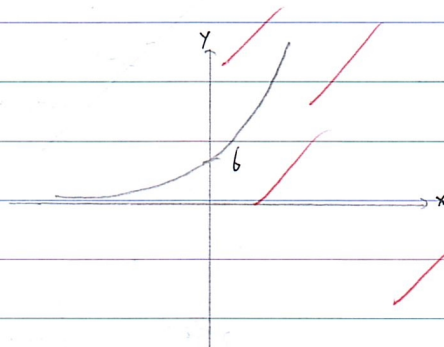
$$\begin{aligned} y &= 8(x-2)^2 - 5 \\ &= 2 \{ 2^2 (x-2)^2 \} - 5 \\ &= 2 (2x-4)^2 - 5 \end{aligned}$$

2.

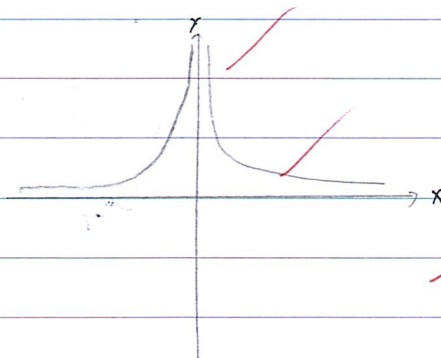


Label here better...

3. (a) $y = 6(2^x)$



(b) $y = \frac{2}{3x^n}$, where n is even



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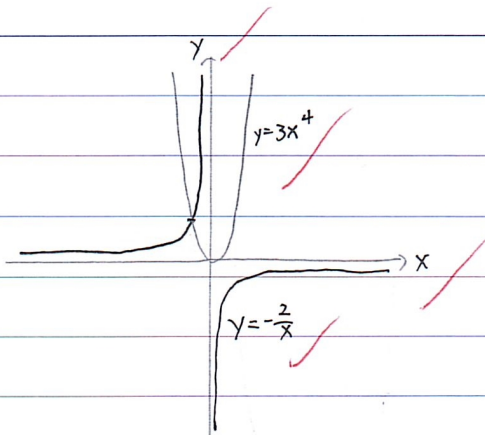
4. (a) $3x^4 + \frac{2}{x} = 0$

$3x^4 = -\frac{2}{x}$ ✓

Let $y = 3x^4$

Let $y = -\frac{2}{x}$

∴ There are only one solution. ✓



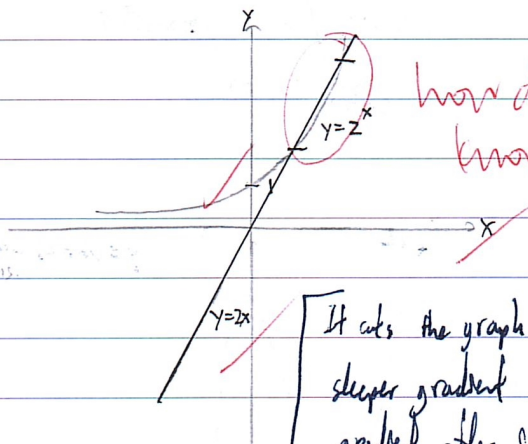
(b) $2^x = 2x$

Let $y = 2^x$

Let $y = 2x$

∴ There are 2 solutions.

$x=1$ and $x=2$ are both solutions.



how do you know? evidence?

It cuts the graph twice as the line has a steeper gradient before intersection and a shallower gradient after intersection.

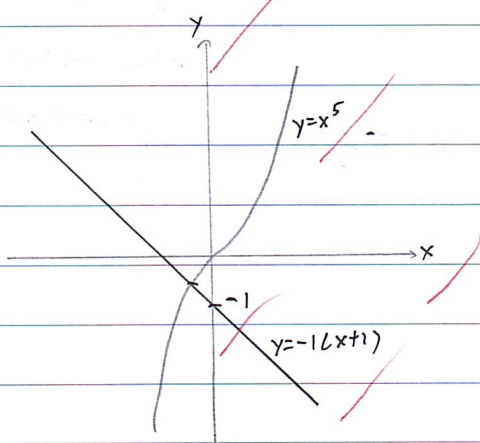
(c) $x^5 + x + 1 = 0$

$x^5 = -x - 1$

Let $y = x^5$

Let $y = -(x+1)$

∴ There are only one solution. ✓



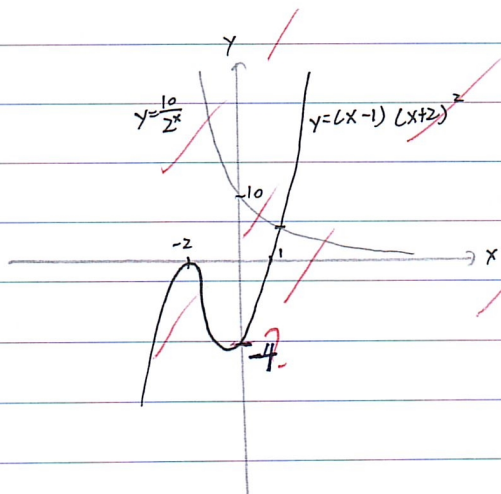
(d) $2^x (x-1)(x+2)^2 = 10$

$(x-1)(x+2)^2 = \frac{10}{2^x}$

Let $y = (x-1)(x+2)^2$

Let $y = \frac{10}{2^x}$

∴ There are only one solution. ✓



29/6/27