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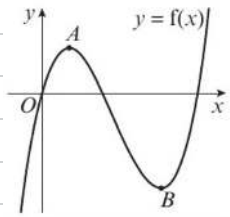
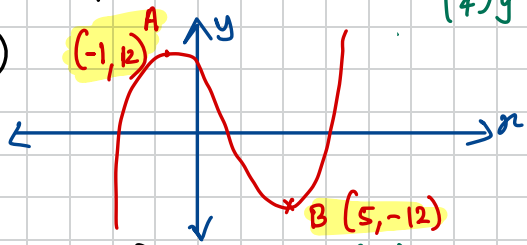
2·6 : Combining transformations

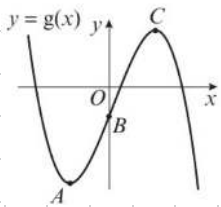
① 

A(2,8) B(8,−16)

$y = f(x+3) + 4$

translation $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ x, y

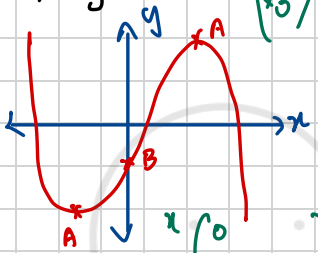


② 

A(−1, −21)
B(1, −6)
C(3, 12)

A(−2, −7) B(0, −2) C(2, 4)

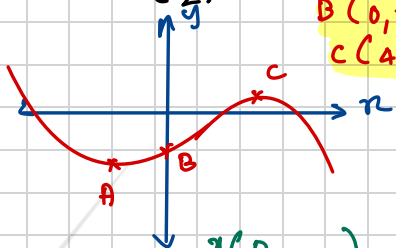
a) $3g(x-1)$ → $\begin{pmatrix} +1 \\ \times 3 \end{pmatrix}$ x, y



x → (0); y → (×−2 and −1)

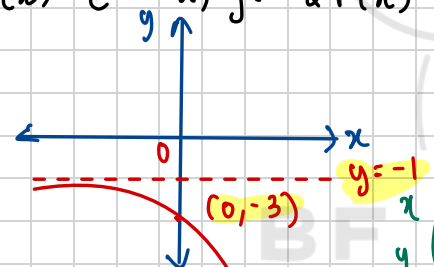
b) $y = g\left(\frac{x}{2}\right) - 2$ → x → $\begin{pmatrix} \times 2 \\ -2 \end{pmatrix}$ y

A (−4, −7)
B (0, −4)
C (4, 2)



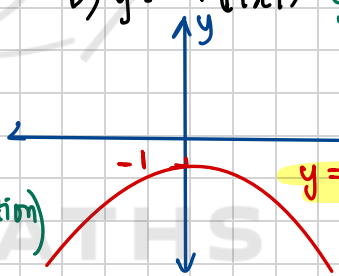
③ $f(x) = e^x$

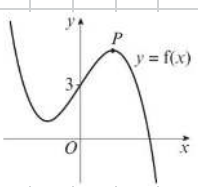
a) $y = -2f(x) - 1$



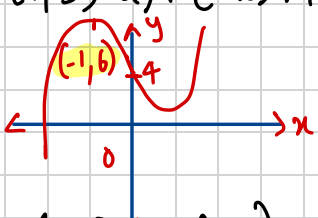
x → (Reflection); y → $\begin{pmatrix} \text{Reflection} \\ +1 \end{pmatrix}$

b) $y = -f(|x|)$ → x → (0); y → (Reflection in x-axis)

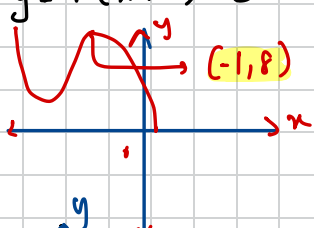


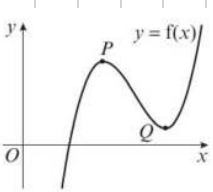
④ 

P(1, 5) a) $f(-x) + 1$



b) $y = f(x+2) + 3$ → x → $\begin{pmatrix} -2 \\ +3 \end{pmatrix}$ y

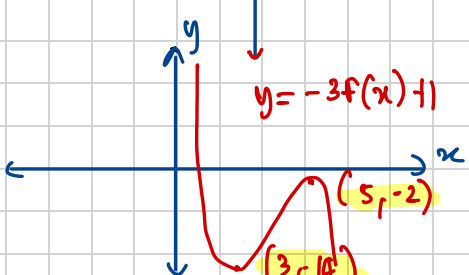


⑤ 

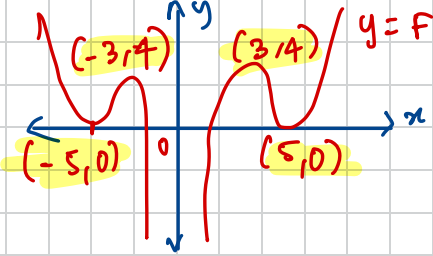
P(3, 5) Q(5, 1)

a) $y = -3f(x) + 1$

x → (0); y → (×−3 and +1)



b) $y = f(|x|) - 1$



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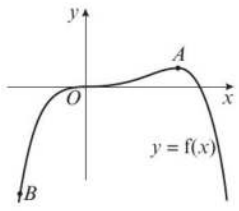
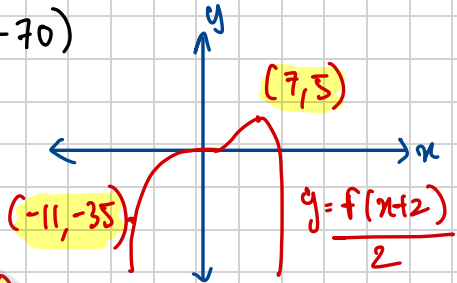


A(9,10) B(-9,-70)

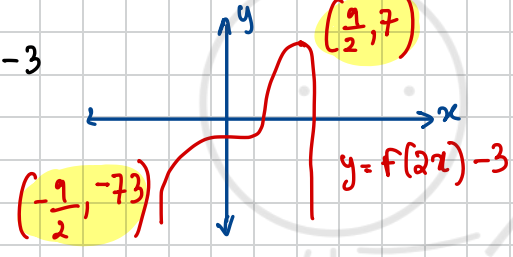
a) $y = \frac{f(x+2)}{2}$

$\begin{pmatrix} -2 \\ x\frac{1}{2} \end{pmatrix} \begin{matrix} x \\ y \end{matrix}$



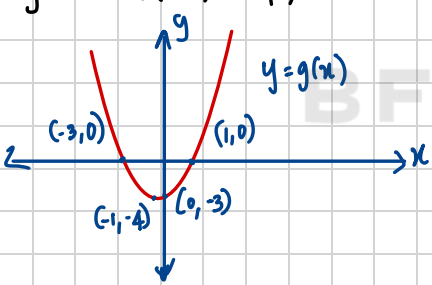
b) $y = f(2x) - 3$

$\begin{matrix} x & (x\frac{1}{2}) \\ y & (-3) \end{matrix}$



7 $g(x) = (x+1)^2 - 4, \quad x \in R$

a)

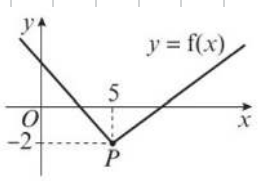


b) i) $y = 2(|g(x)|) + 2 = (-1, 4(2)+2) = (-1, 10)$

ii) $y = -3g(x+1) = (-1-1, -4x-3) = (-2, 12)$

iii) $y = g(2x) + 1 = \left(-1 \times \frac{1}{2}, -4+1\right) = \left(-\frac{1}{2}, -3\right)$

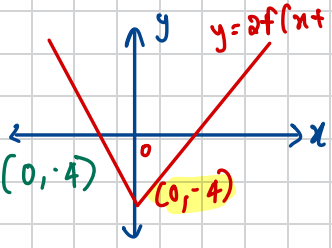
8



P(5,-2)

a) $y = 2f(x+5)$

$\Rightarrow (5-5, -2(2)) = (0, -4)$



b) $y = |f(-x)|$