

GRAPHS

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Type 1

When adding two 2nd degree functions together, 2 situations can arise:

- 1) When a second degree function is added to another second degree function, it produces a constant function.

$$\begin{aligned} 2^{\text{nd}} \text{ degree} + 2^{\text{nd}} \text{ degree} &= \text{Constant} \\ (\text{quadratic}) \quad (\text{quadratic}) &= (\text{horizontal line}) \end{aligned}$$

- 2) When a second degree function is added to another second degree function, it produces a third second degree function.

$$\begin{aligned} 2^{\text{nd}} \text{ degree} + 2^{\text{nd}} \text{ degree} &= 2^{\text{nd}} \text{ degree} \\ (\text{quadratic}) \quad (\text{quadratic}) &= (\text{quadratic}) \end{aligned}$$

Type 2

When multiplying two first degree functions together, it produces a second degree function.

$$\begin{aligned} 1^{\text{st}} \text{ degree} \times 1^{\text{st}} \text{ degree} &= 2^{\text{nd}} \text{ degree} \\ (\text{linear}) \quad (\text{linear}) &= (\text{quadratic}) \end{aligned}$$

Type 3

When subtracting a constant function from a first degree function, it produces a first degree function.

$$\begin{aligned} \text{Constant} - 1^{\text{st}} \text{ degree} &= 1^{\text{st}} \text{ degree} \\ (\text{horizontal line}) \quad (\text{linear}) &= (\text{linear}) \end{aligned}$$

Type 1: Example

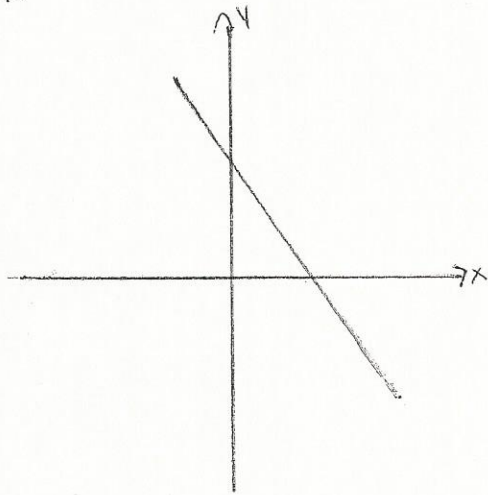
Functions h and i are defined below:

$$h(x) = a_1x^2 \quad \text{where } a_1 \text{ is } > 0$$

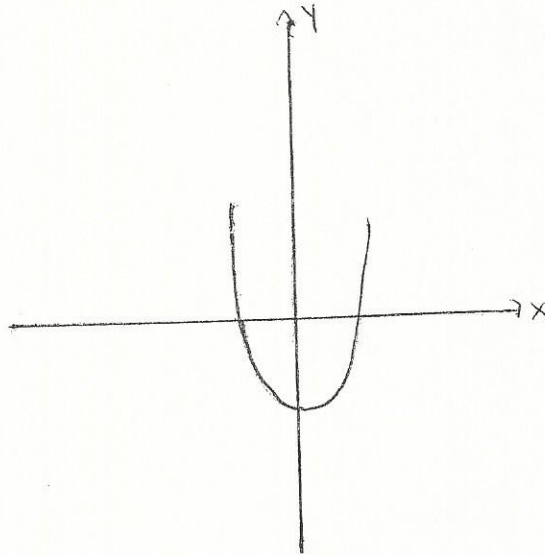
$$i(x) = a_2x^2 + c \quad \text{where } a_2 \text{ is } = -a_1 \text{ and } c < 0$$

Which one of the following graphs could represent $h + i$?

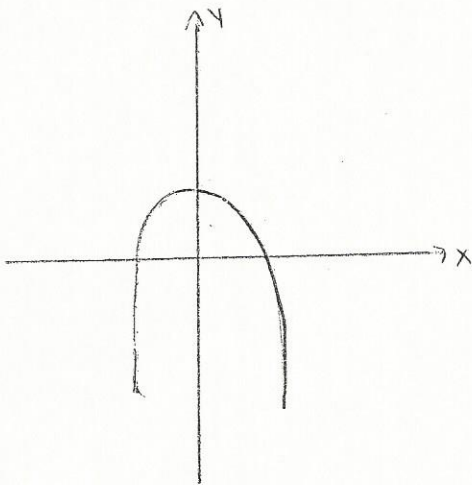
A)



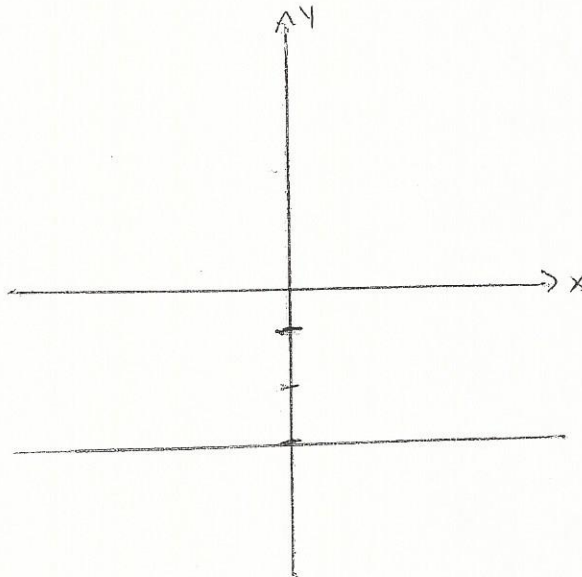
B)



C)



D)



Type 1

Practice Exercises:

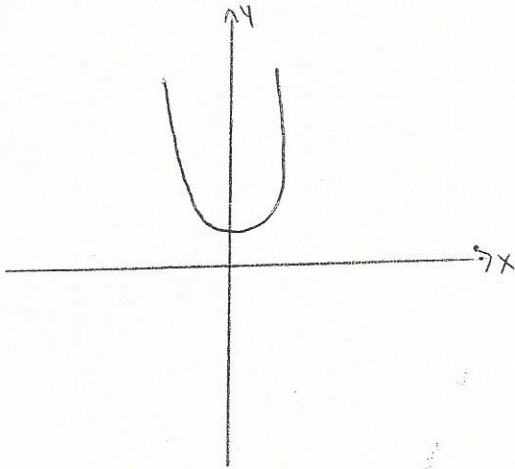
1. Functions **a** and **b** are defined below:

$$a(x) = a_1x^2 \quad \text{where } a_1 \text{ is } < 0$$

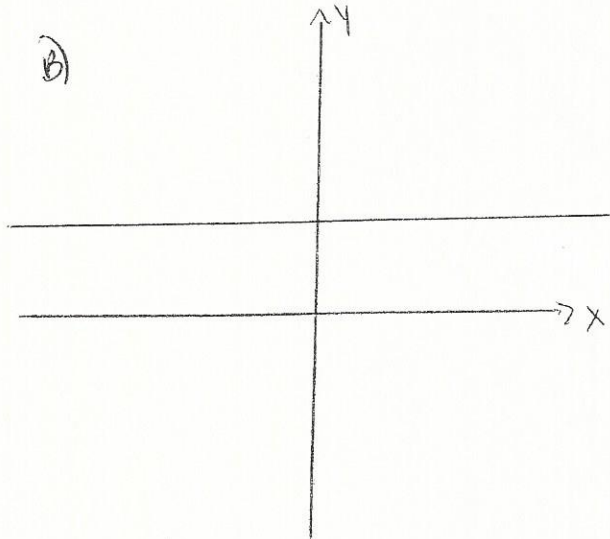
$$b(x) = a_2x^2 + c \quad \text{where } a_2 \text{ is } = -a_1 \text{ and } c > 0$$

Which one of the following graphs could represent $a + b$?

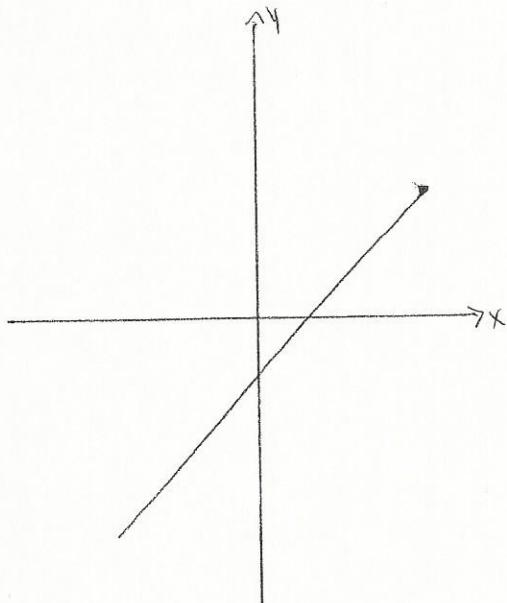
A)



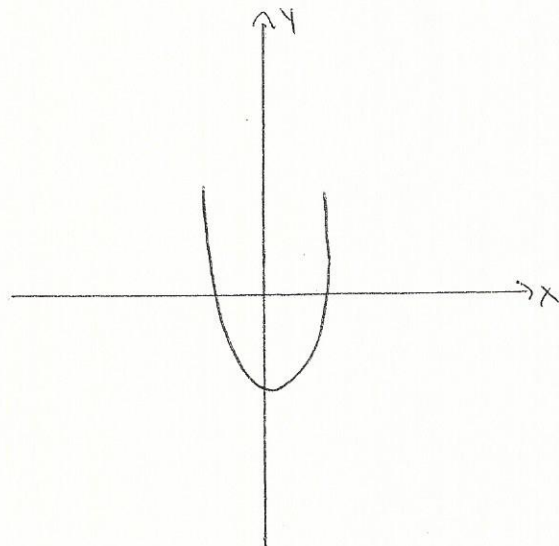
B)



C)



D)

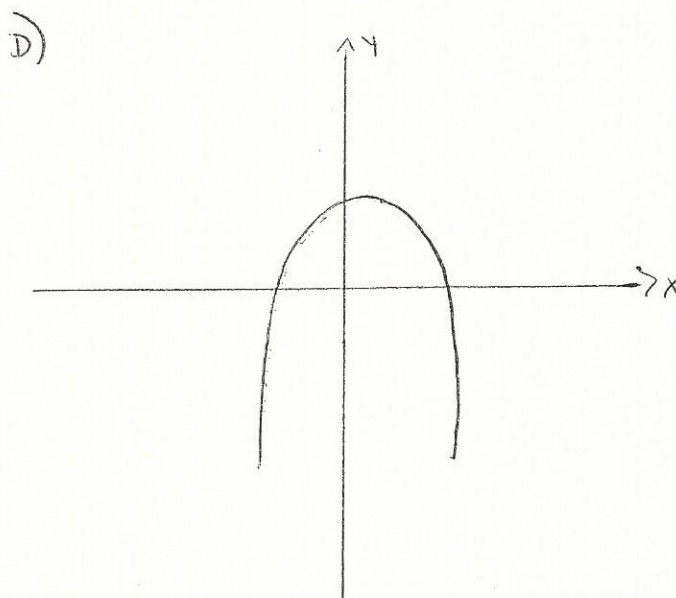
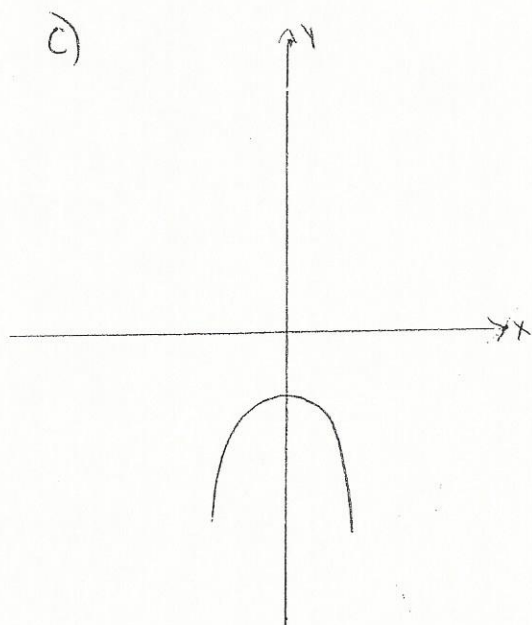
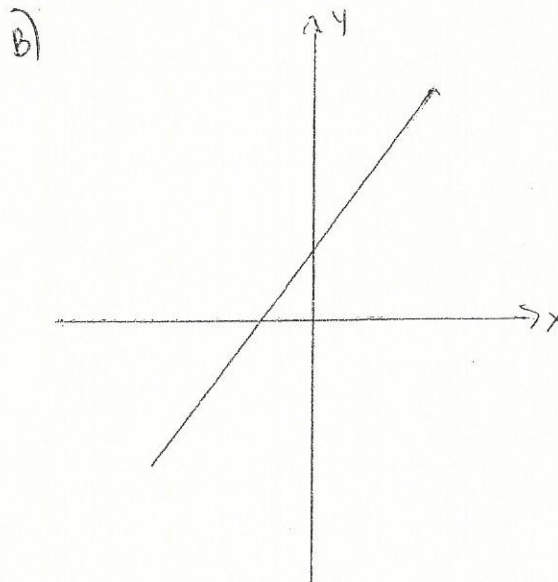
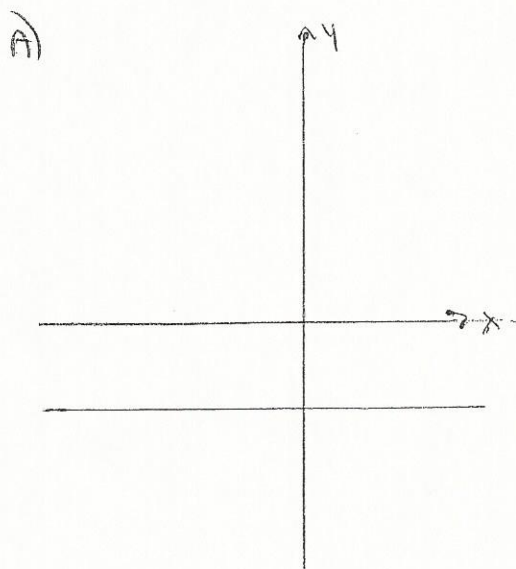


2. Functions d and e are defined below:

$$d(x) = a_1x^2 + c \quad \text{where } a_1 \text{ is } >0 \text{ and } c < 0$$

$$e(x) = a_2x^2 \quad \text{where } a_2 \text{ is } = -a_1$$

Which one of the following graphs could represent $d + e$?



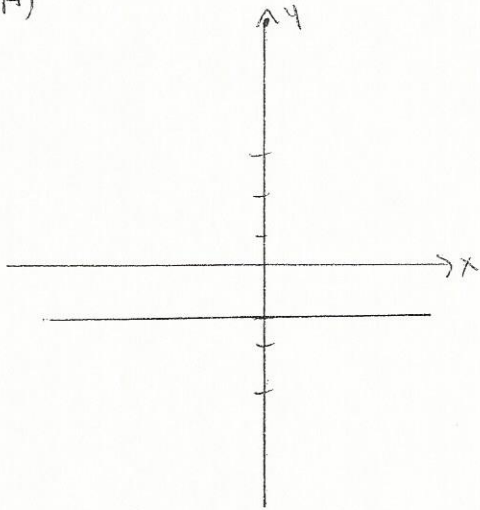
3. Functions j and k are defined below:

$$j(x) = a_1x^2 + c \quad \text{where } a_1 \text{ is } < 0 \text{ and } c < 0$$

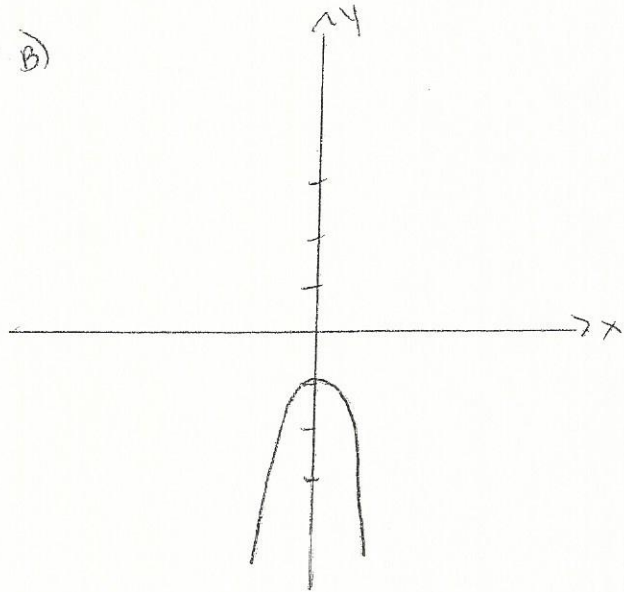
$$k(x) = a_2x^2 \quad \text{where } a_2 \text{ is } = a_1$$

Which one of the following graphs could represent $j + k$?

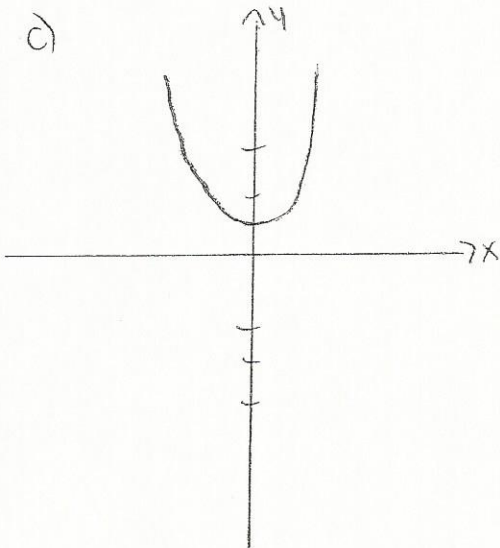
A)



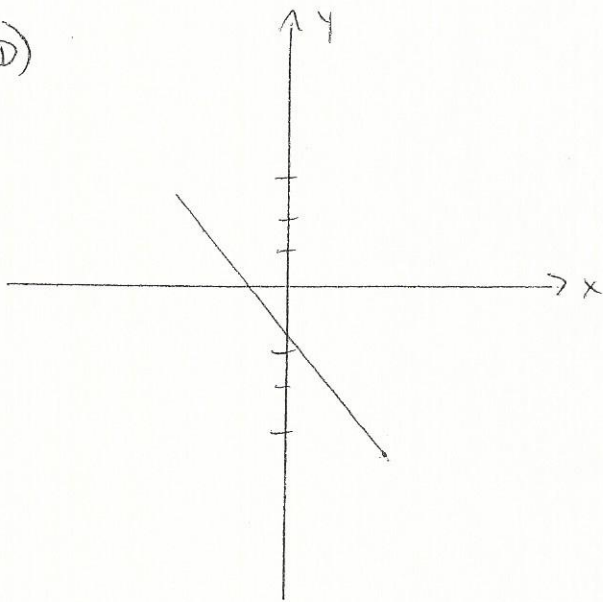
B)



C)



D)

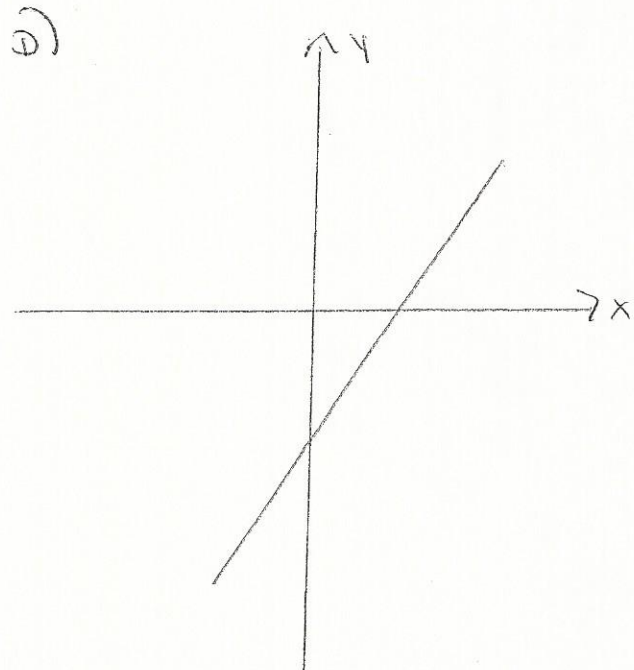
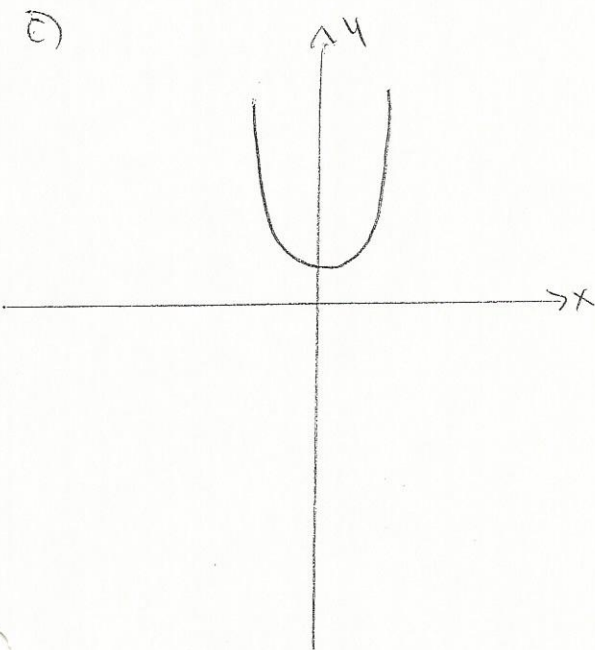
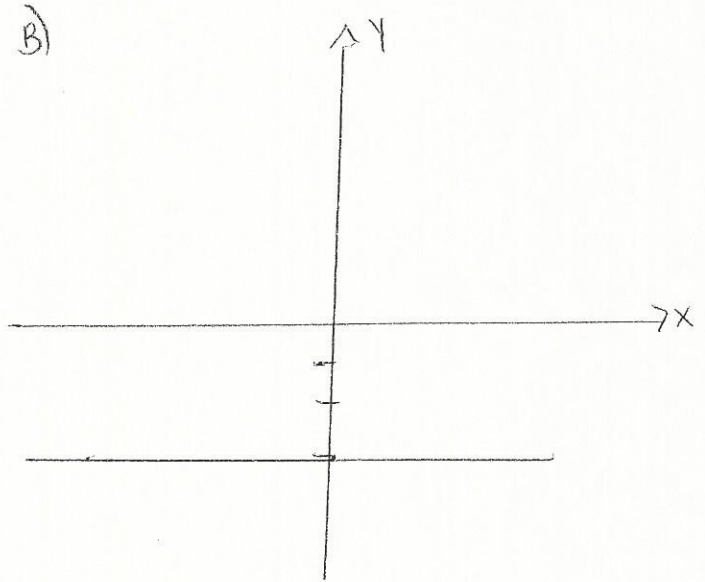
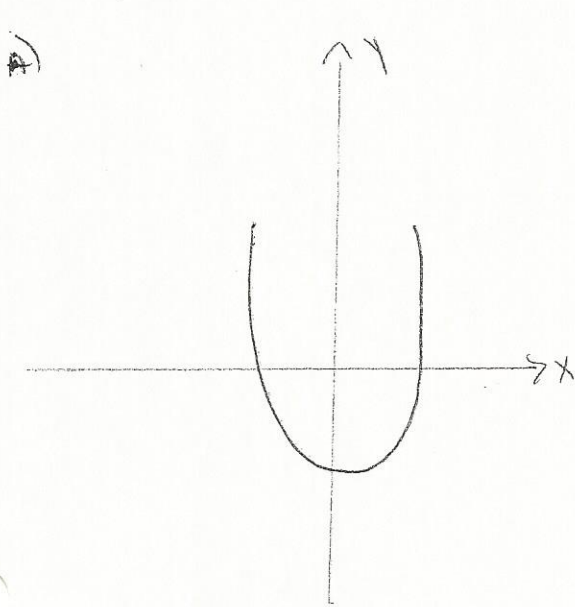


4. Functions g and h are defined below:

$$g(x) = a_1x^2 + c \quad \text{where } a_1 \text{ is } >0 \text{ and } c > 0$$

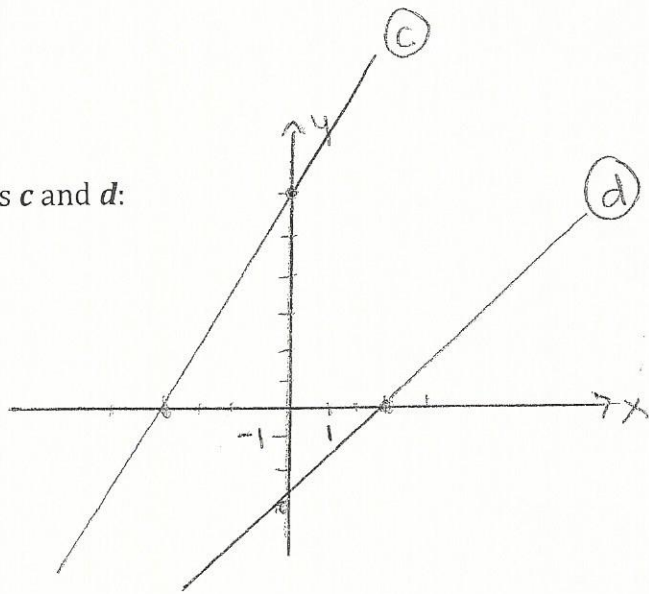
$$h(x) = a_2x^2 \quad \text{where } a_2 \text{ is } = a_1$$

Which one of the following graphs could represent $g + h$?

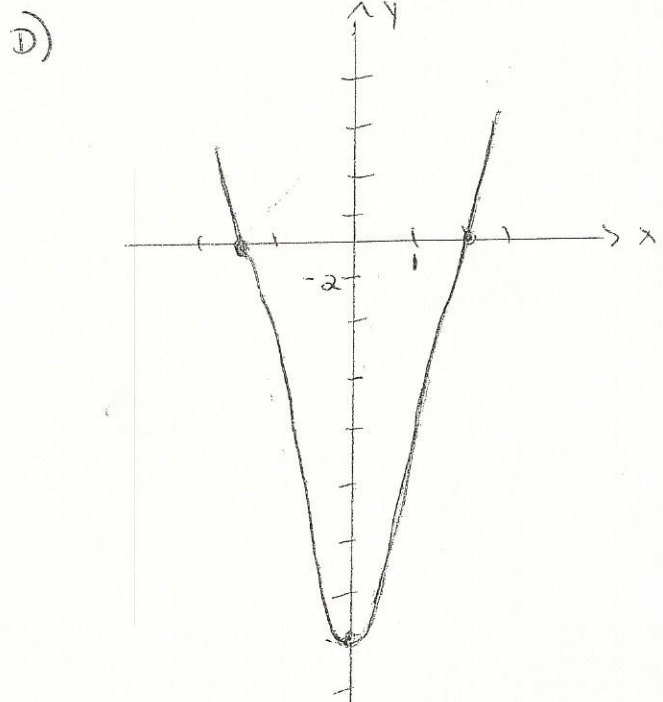
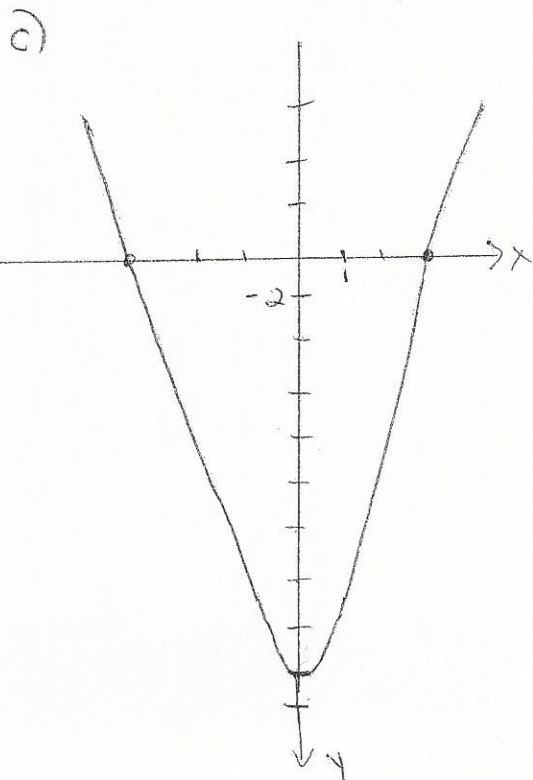
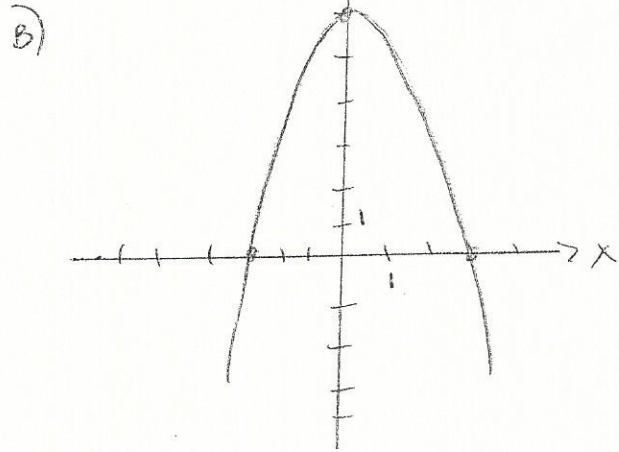
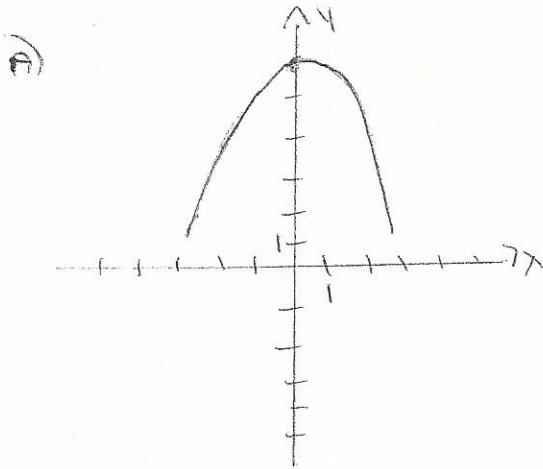


Type 2: Example

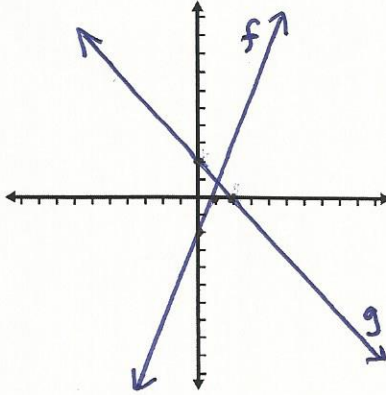
The following graph represents functions c and d :



Which one of the following graphs could represent $c \cdot d$?

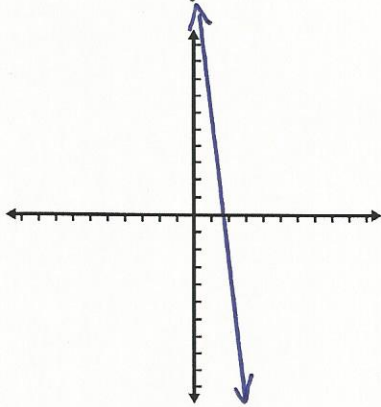


1. The following graph represents functions f and g :

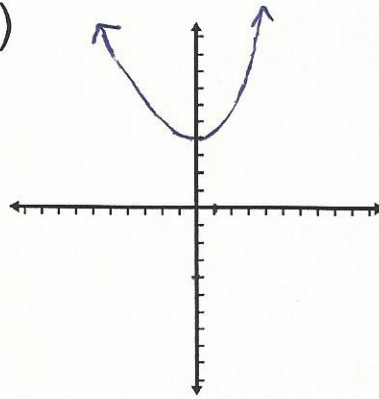


Which one of the following graphs could represent $f \cdot g$?

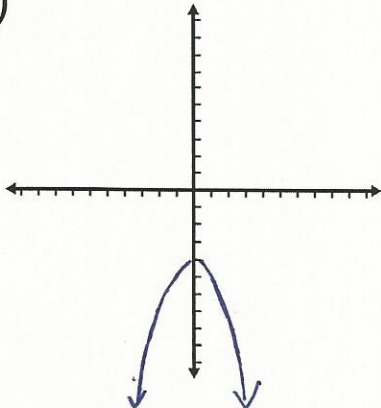
(A)



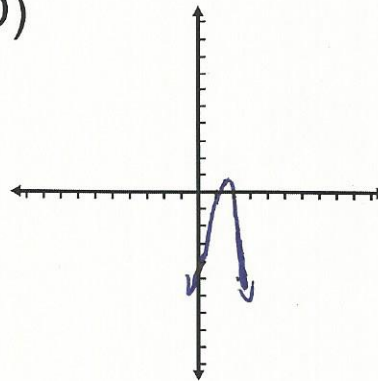
(C)



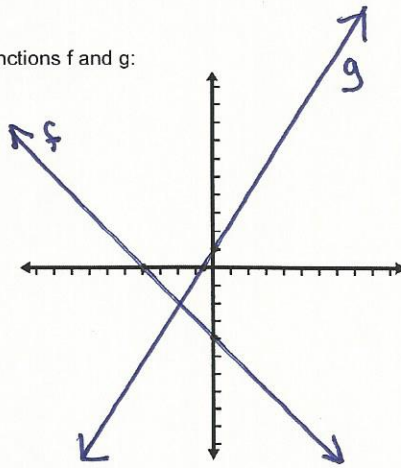
(B)



(D)

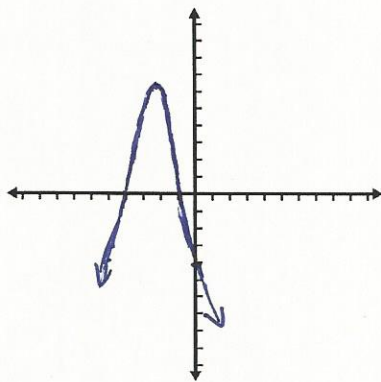


2. The following graph represents functions f and g :

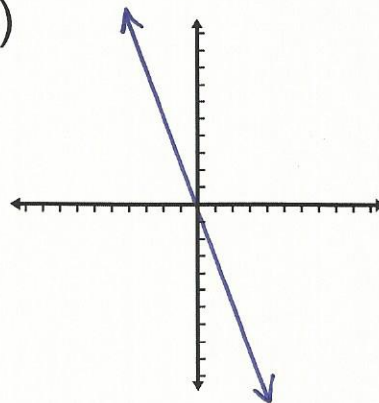


Which one of the following graphs could represent $f \cdot g$?

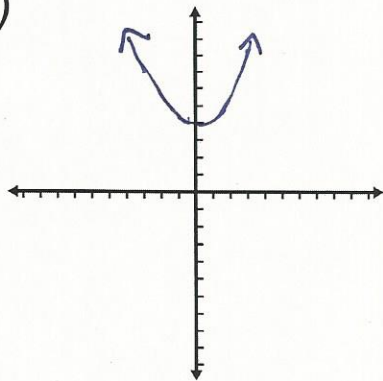
(A)



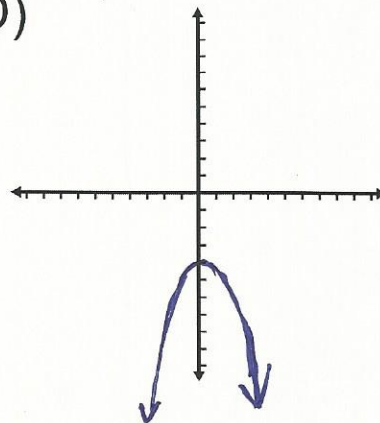
(C)



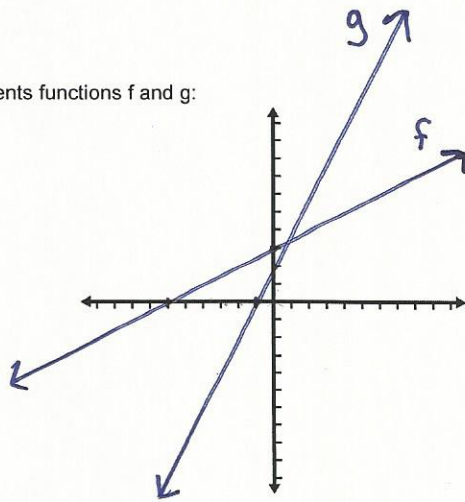
(B)



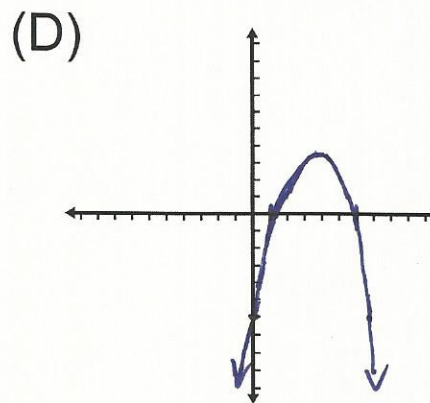
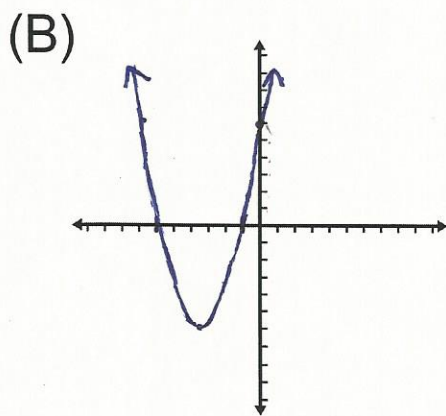
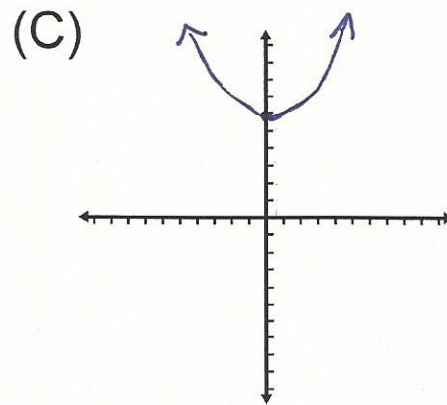
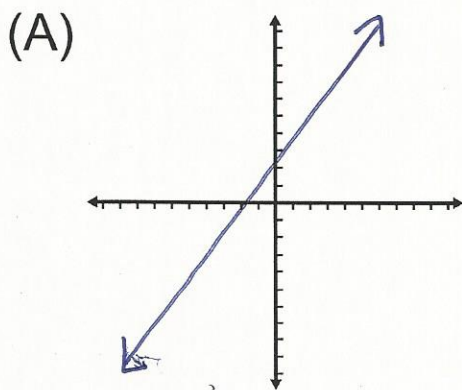
(D)



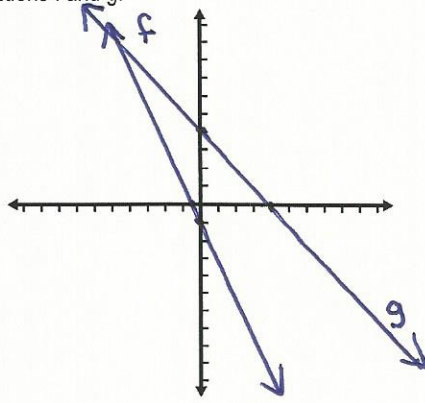
3. The following graph represents functions f and g :



Which one of the following graphs could represent $f \cdot g$?

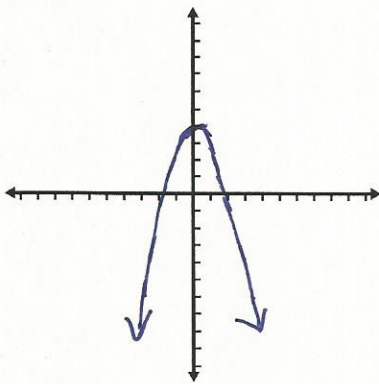


4. The following graph represents functions f and g :

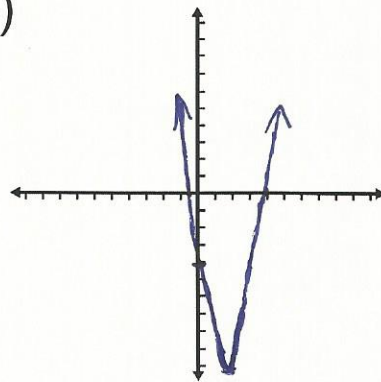


Which one of the following graphs could represent $f \cdot g$?

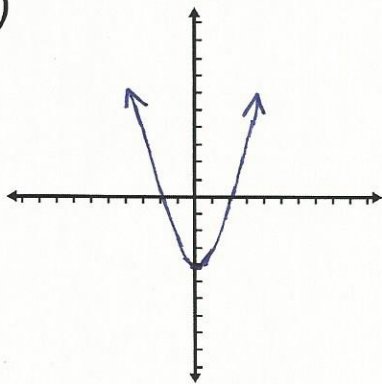
(A)



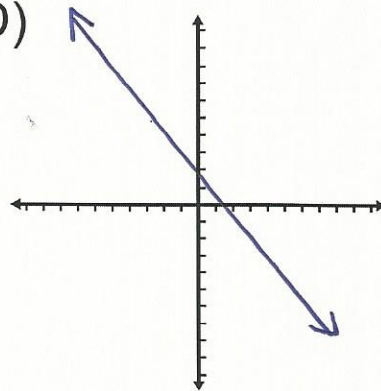
(C)



(B)



(D)



Type 3: Example

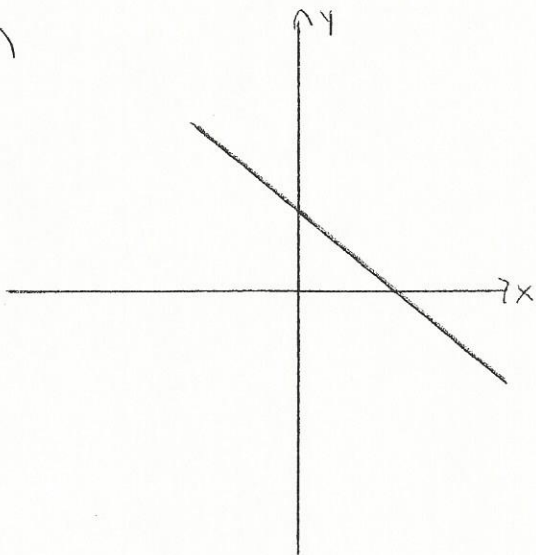
Functions a_1 and a_2 are defined below:

$$a_1(x) = ax + b_1 \quad \text{where } a < 0 \text{ and } b_1 < 0$$

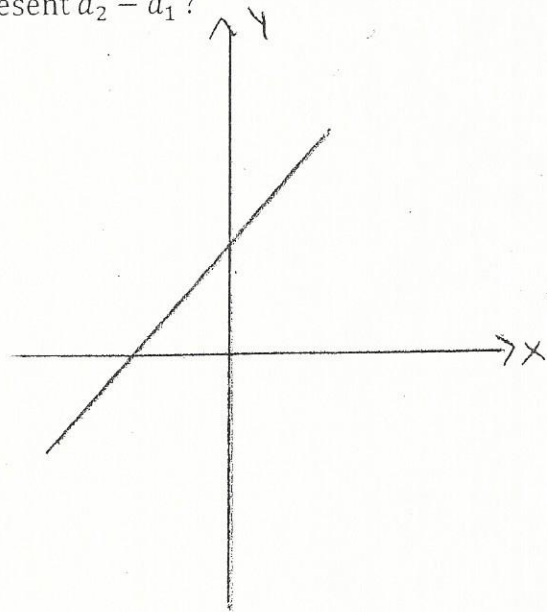
$$a_2(x) = b_2 \quad \text{where } b_2 = -b_1$$

Which one of the following graphs could represent $a_2 - a_1$?

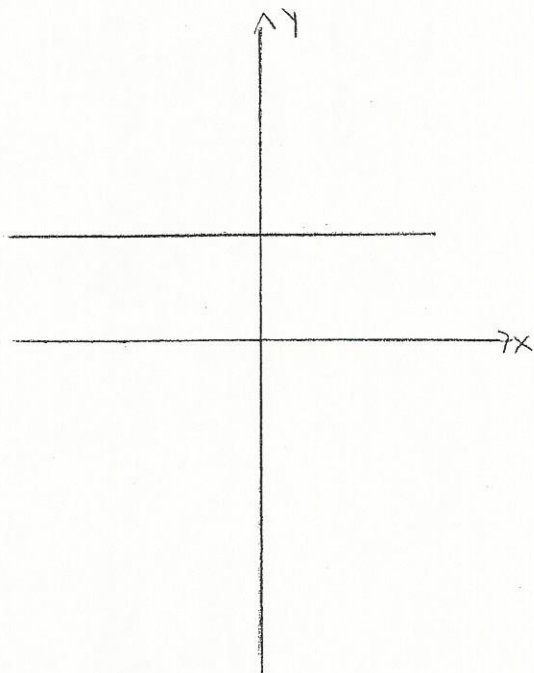
A)



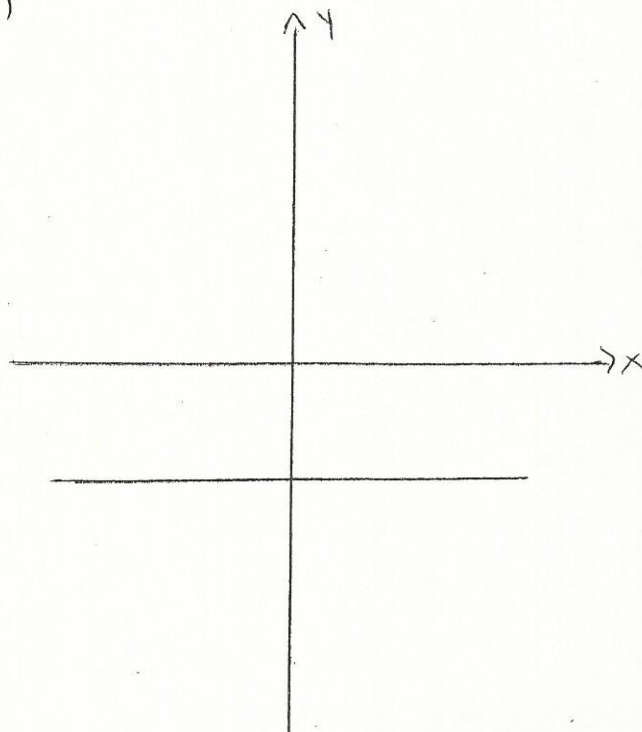
B)



C)



D)



Type 3: Practice

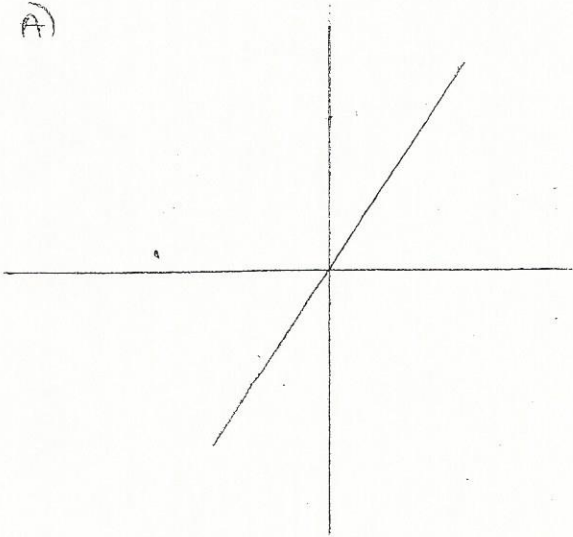
1. Functions b_1 and b_2 are defined below:

$$g_1(x) = ax + b_1 \quad \text{where } a < 0 \text{ and } b_1 > 0$$

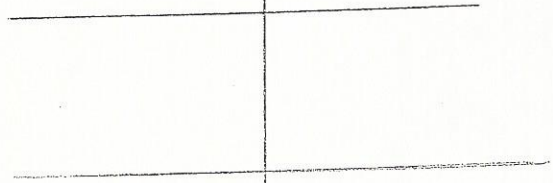
$$g_2(x) = b_2 \quad \text{where } b_2 = -b_1$$

Which one of the following graphs could represent $g_1 - g_2$?

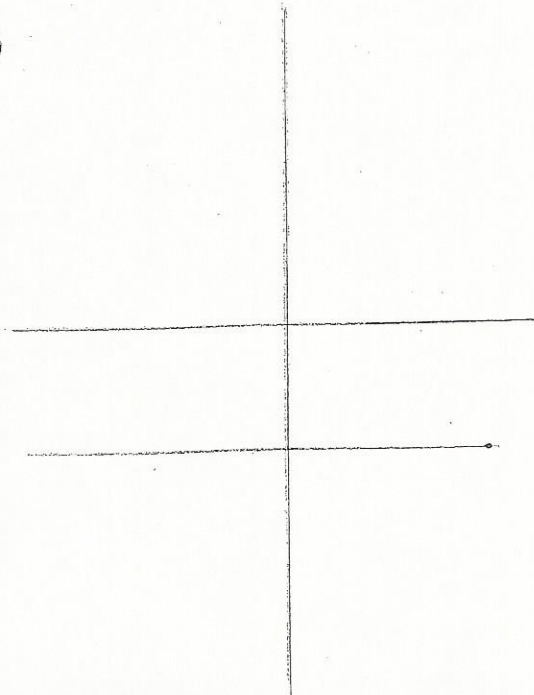
A)



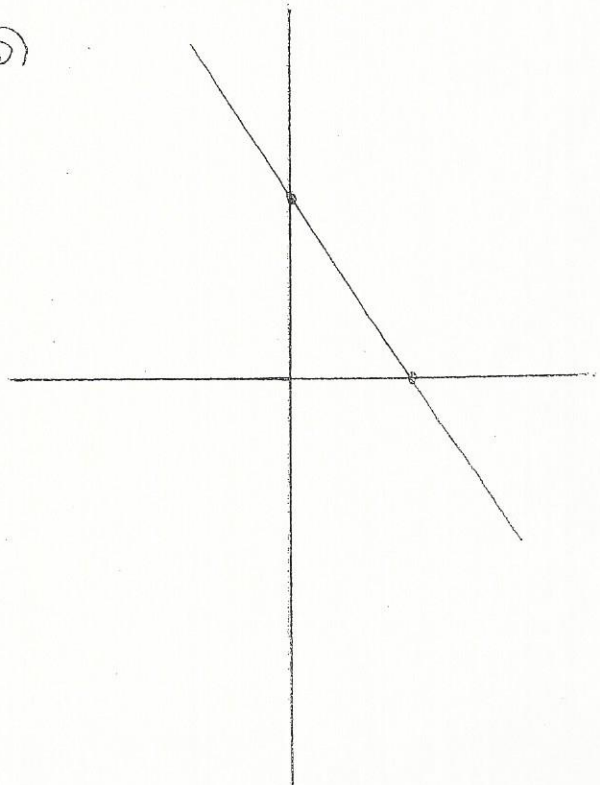
B)



C)



D)



Type 3: Practice

2. Functions h_1 and h_2 are defined below:

$$h_1(x) = b_1 \quad \text{where } b_1 = -b_2$$

$$h_2(x) = ax + b_2 \quad \text{where } a > 0 \text{ and } b_2 > 0$$

Which one of the following graphs could represent $h_2 - h_1$?

