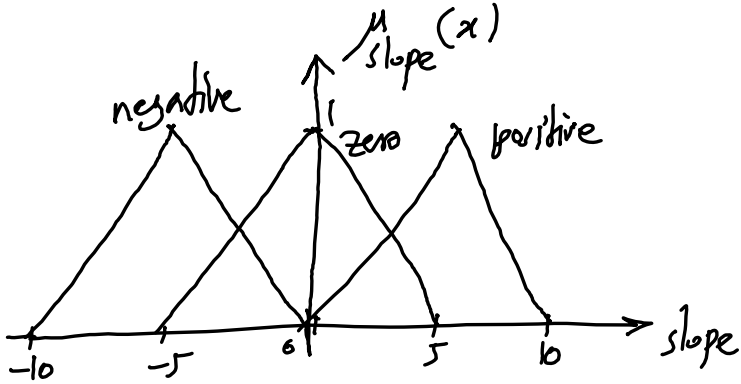
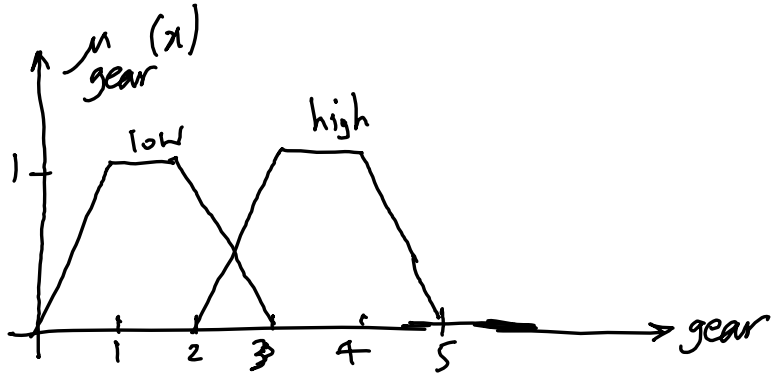
1) if slope is negative and gear is low, then gas should be low.

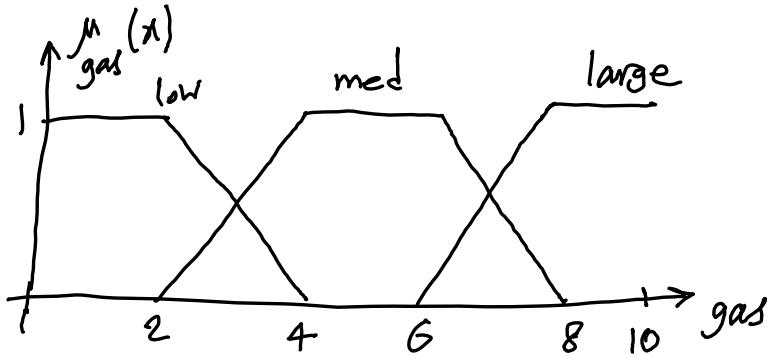
2) if slope is negative and gear is high, then gas should be medium.

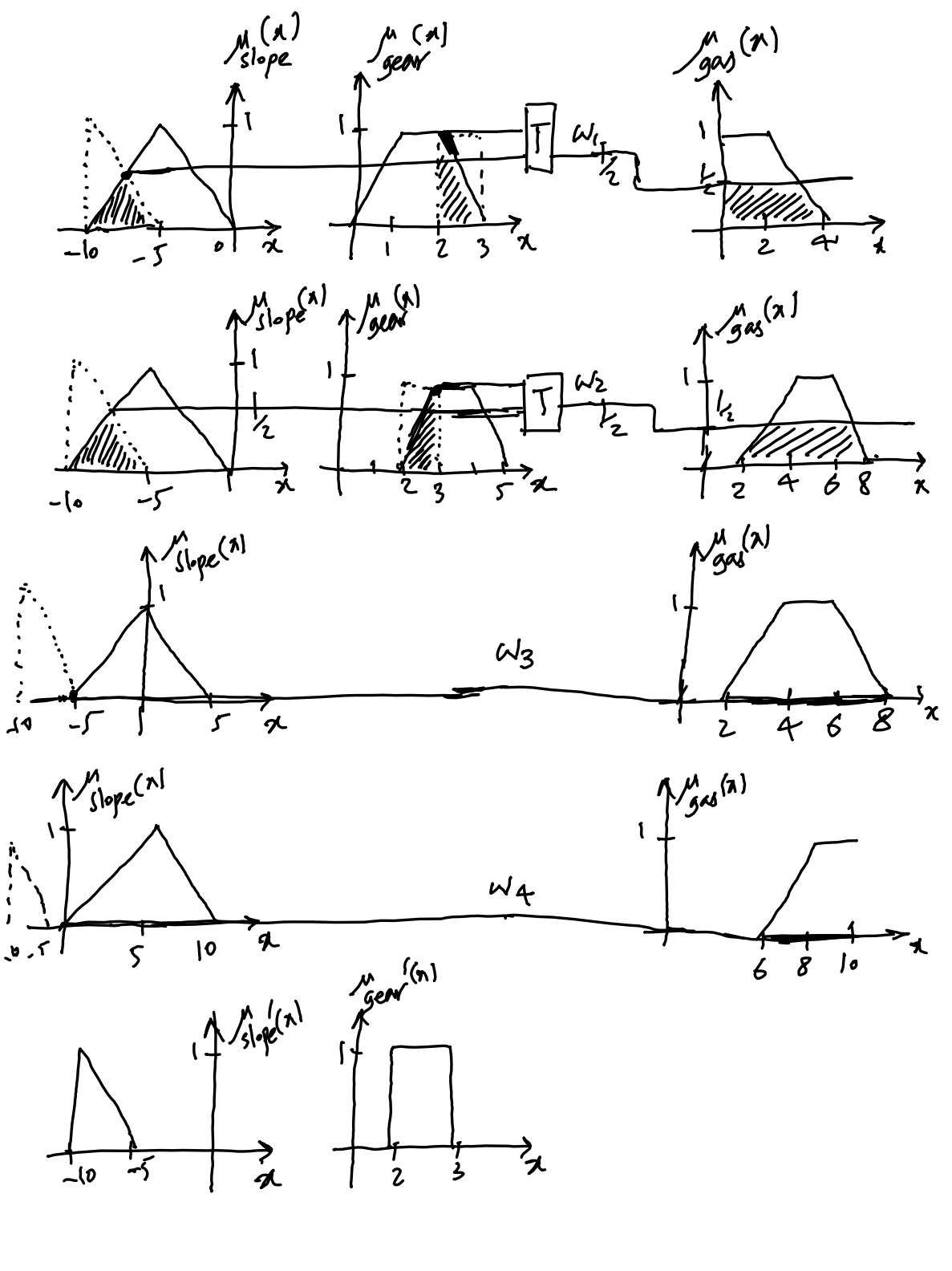
3) if slope is zero, then gas should be medium.

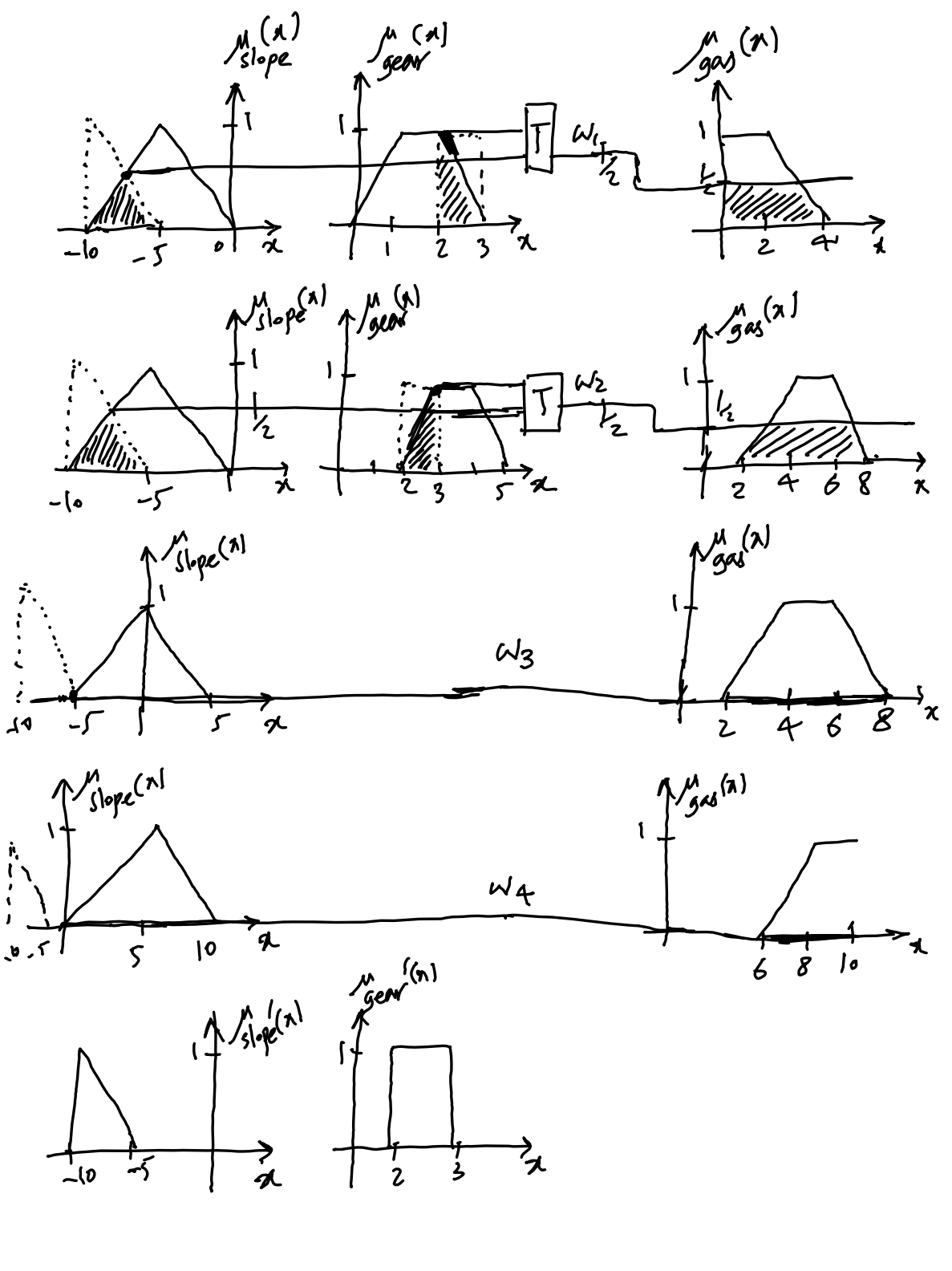
4) if slope is positive, then gas should be large.

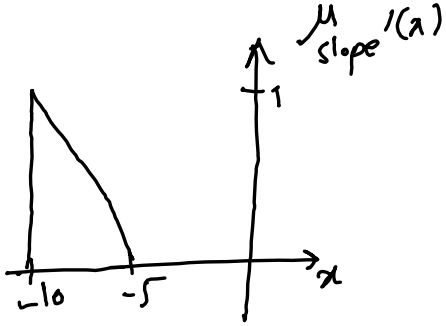

μ slope (x)
negative
zero
positive
1
-10
-5
0
5
10
slope

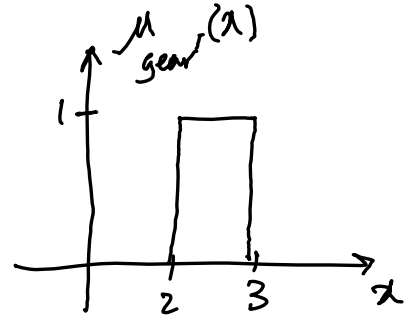

μ gear (x)
low
high
1
1
2
3
4
5
gear

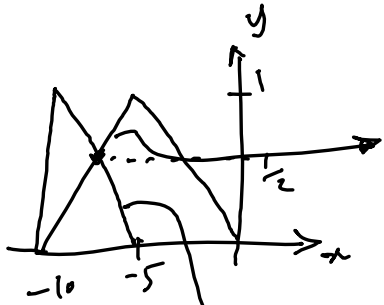

μ gas (x)
low
med
large
1
2
4
6
8
10
gas


$\mu_{slope}(x)$
$\mu_{gear}(x)$
$\mu_{gas}(x)$
T
w_1
w_2
w_3
w_4
$\mu'_{slope}(x)$
$\mu'_{gear}(x)$
-10
-5
0
1
2
3
4
5
6
8
10
x


$\mu_{slope}(x)$
$\mu_{gear}(x)$
$\mu_{gas}(x)$
T
w_1
w_2
w_3
w_4
$\mu'_{slope}(x)$
$\mu'_{gear}(x)$
-10
-5
0
1
2
3
4
5
6
8
10
x







$$y-1=\frac{1-0}{-5-(-10)}(x+5)$$

$$y-1=\frac{1}{5}(x+5)=\frac{x}{5}+1$$

$$\hookrightarrow \boxed{y=\frac{x}{5}+2}\ \bigstar$$

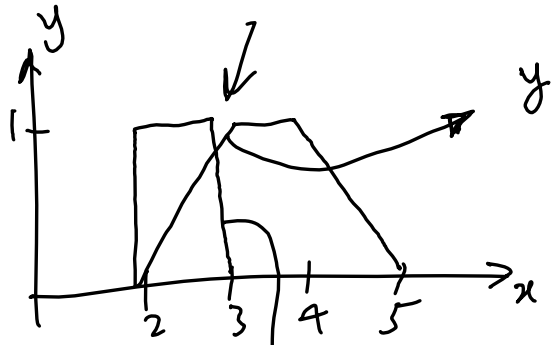
$$y-0=\frac{0-1}{-5-(-10)}(x-(-5))$$

$$\hookrightarrow y=\frac{-1}{5}(x+5)=\frac{-x}{5}-1$$

$$\boxed{y=\frac{-x}{5}-1}$$

$$\frac{x}{5}+2=\frac{-x}{5}-1 \rightarrow \frac{2x}{5}=-3 \rightarrow x=\frac{-15}{2}$$

$$y=\frac{-3}{2\times 8}+2=\frac{-3}{2}+2=\frac{-3+4}{2}=\frac{1}{2}$$

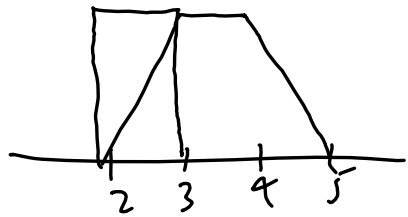


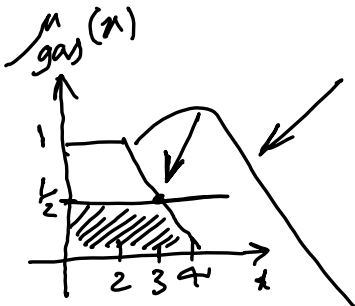
$$y - 0 = \frac{1-0}{3-2}(x-2)$$

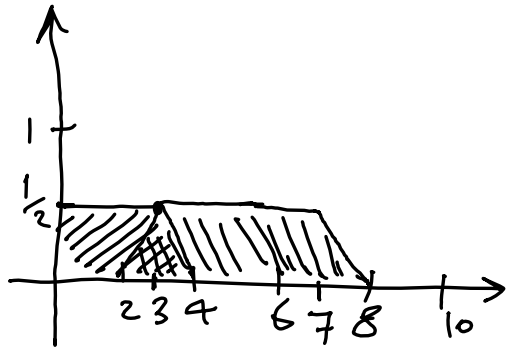
$$y = x - 2$$

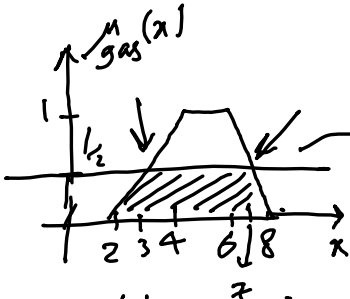
$x = 3$

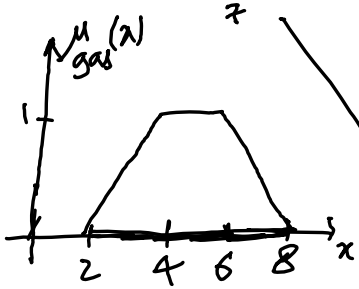
$$y = 3 - 2 = 1$$

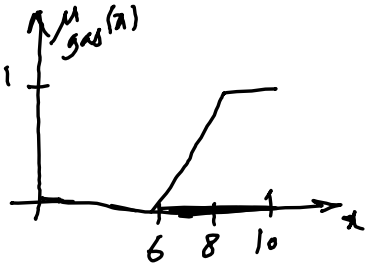












$$y-0=\frac{0-1}{4-2}(x-4)$$

$$y=\frac{-1}{2}(x-4)=\frac{-x}{2}+2$$

$$y=1/2$$

$$1/2=\frac{-x}{2}+2$$

$$-\frac{x}{2}=\frac{1}{2}-2=\frac{-3}{2}$$

$$\boxed{x=3}$$

$$y-0=\frac{1-0}{4-2}(x-2)$$

$$y=\frac{1}{2}(x-2)=\frac{x}{2}-1$$

$$y=1/2$$

$$1/2=\frac{x}{2}-1 \rightarrow \frac{x}{2}=\frac{3}{2}$$

$$\boxed{x=3}$$

$$y-0=\frac{0-1}{8-6}(x-8)$$

$$\begin{cases} y=\frac{-1}{2}(x-8)=\frac{-x}{2}+4 \\ y=1/2 \end{cases} \Rightarrow 1/2=\frac{-x}{2}+4 \rightarrow 1=-x+8$$

$$\boxed{x=7}$$

$$\hookrightarrow \int_0^8 x\,\mu(x)\,dx = 12.25 + 1.84 = 14.09$$

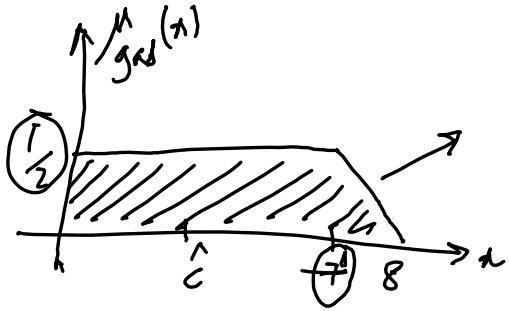
$$\int_0^8 \mu(x)\,dx = \int_0^7 \frac{1}{2}\,dx + \int_7^8 \left(-\frac{x}{2}+4\right)dx =$$

$$= \frac{1}{2}x\Big|_0^7 + \left(-\frac{1}{2}\,\frac{x^2}{2} + 4x\right)\Big|_7^8$$

$$= \frac{1}{2}(7-0) + \left(-\frac{1}{4}\right)(64-49) + 4(8-7)$$

$$= \underbrace{\frac{7}{2}}_{3.5} - 3.75 + 4 = 3.75$$

$$\hat{C} = \frac{14.09}{3.75} = 3.757$$



$$\int_{\min(S)}^{\hat{c}} \mu(x)\,dx = \int_{\hat{c}}^{\max(S)\to 8} \mu(x)\,dx$$

$\min(S) \to 0$

$$\int_0^{\hat{c}} \mu(x)\,dx = \int_{\hat{c}}^{8} \mu(x)\,dx$$

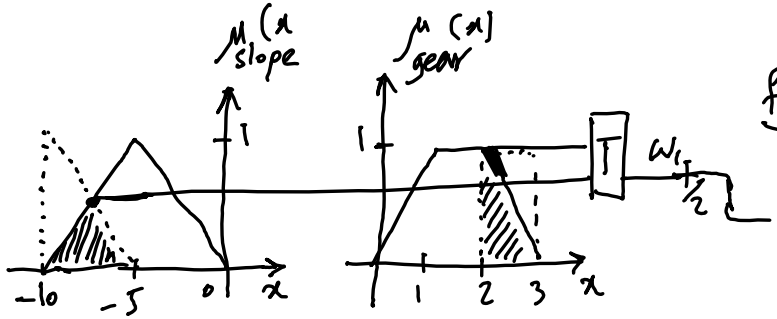
$$\hookrightarrow \int_0^{\hat{c}} \tfrac{1}{2}\,dx = \int_{\hat{c}}^{7} \tfrac{1}{2}\,dx + \int_7^8 \left(-\tfrac{x}{2}+4\right)dx$$

$$\tfrac{1}{2}x\Big|_0^{\hat{c}} = \tfrac{1}{2}x\Big|_{\hat{c}}^{7} + \left(-\tfrac{1}{2}\tfrac{x^2}{2}+4x\right)\Big|_7^8$$

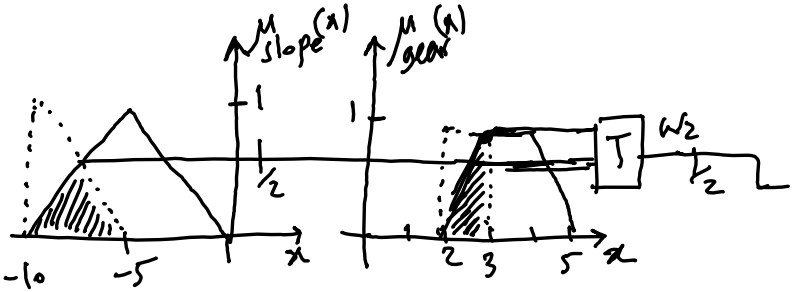
$$\tfrac{1}{2}(\hat{c}-0) = \tfrac{1}{2}(7-\hat{c}) + \underbrace{\tfrac{-1}{4}(64-49)}_{-3.75} + \underbrace{4(8-7)}_{4}$$

$$\hookrightarrow \tfrac{\hat{c}}{2} = 3.5 - \tfrac{\hat{c}}{2} - 3.75 + 4 = 3.75 - \tfrac{\hat{c}}{2}$$

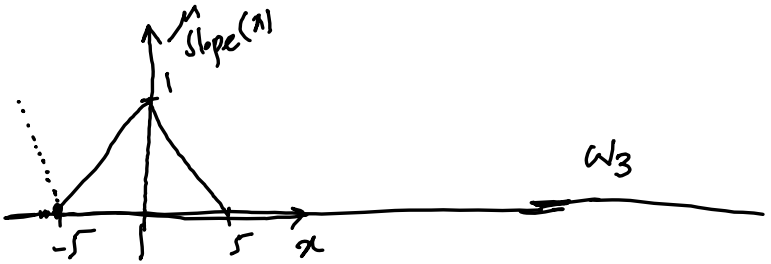
$$\hookrightarrow \hat{c} = 3.75 \quad \checkmark$$



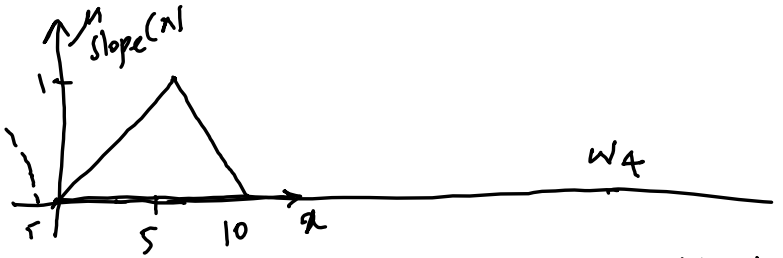
$f_1 = 3s + 2g$



$f_2 = 3s^2$



$f_3 = g + 5$



$f_4 = 1$

$s = -10$

$g = 2.5$

$f_1 = 3(-10) + 2(2.5) = -30 + 5 = -25$

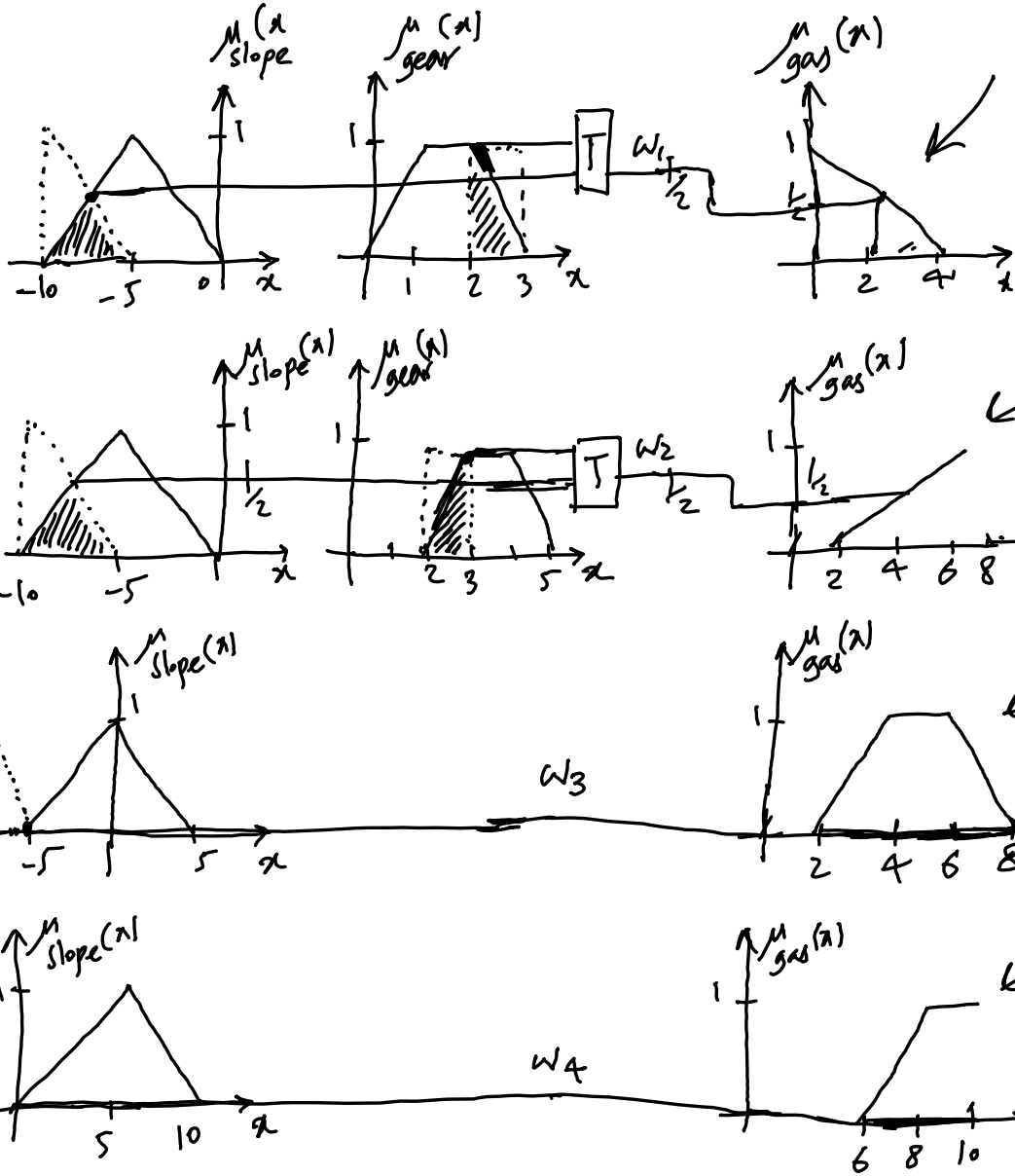
$f_2 = 3(-10)^2 = 300$

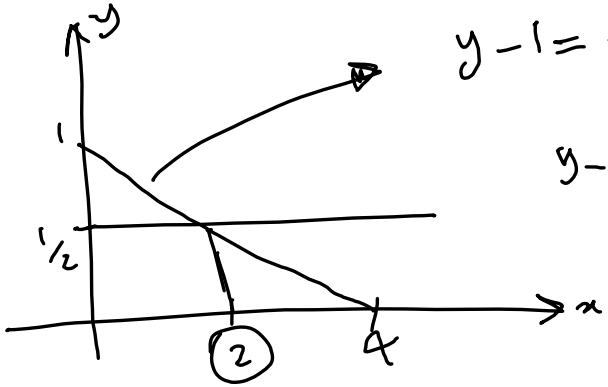
$f_3 = 2.5 + 5 = 7.5$

$f_4 = 1 \quad = 1$

$$f = \frac{w_1 f_1 + w_2 f_2 + w_3 f_3 + w_4 f_4}{w_1 + w_2 + w_3 + w_4}$$

$$= \frac{\frac{1}{2} f_1 + \frac{1}{2} f_2}{\frac{1}{2} + \frac{1}{2}} = f_1 + f_2 = -25 + 300$$


μ slope (x)
μ gear (x)
μ gas (x)
T
W1
W2
W3
W4
1/2
-10
-5
0
1
2
3
4
5
6
8
10
x



$$y-1=\frac{0-1}{4-0}(x-0)$$

$$y-1=-\frac{1}{4}(x)$$

$$y=-\frac{x}{4}+1$$

$$y=\frac{1}{2}$$

$$\frac{1}{2}=-\frac{x}{4}+1$$

$$\frac{x}{4}=\frac{1}{2} \rightarrow x=2$$