Review

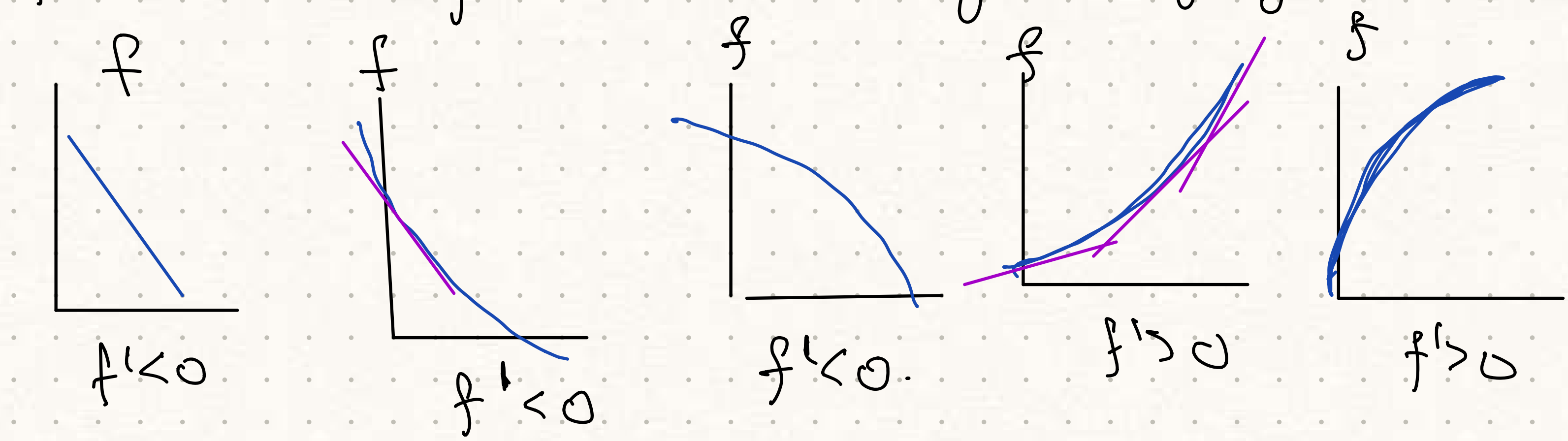
See post for recordings from Prof Cannizzo for 3R, 3.8, 4.1.

4.5, Ch 4 Review.

Recall:

$f' > 0 \iff f$ is increasing $\iff$ going "uphill"

$f' < 0 \iff f$ is decreasing $\iff$ going "downhill"

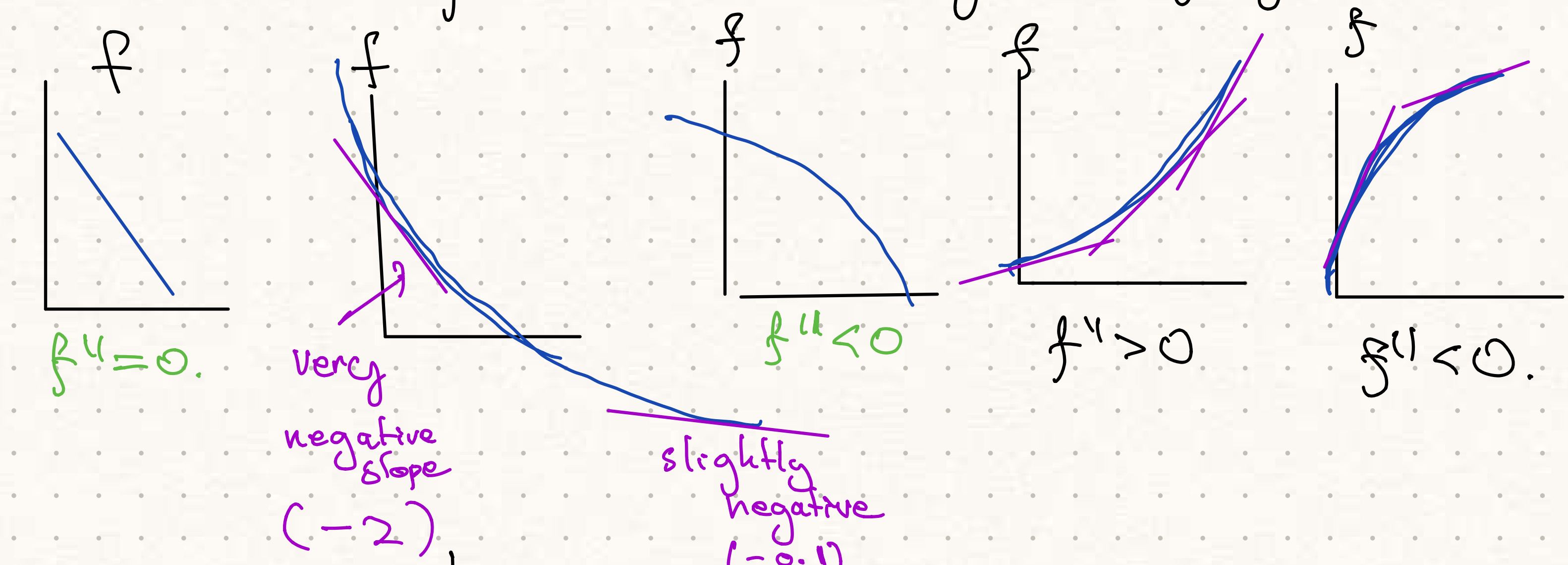


$f'' > 0 \iff f'$ is increasing $\iff f$ is "getting steeper"

$\iff$ slope increasing

$f'' < 0 \iff f'$ is decreasing $\iff f$ is not "getting steeper"

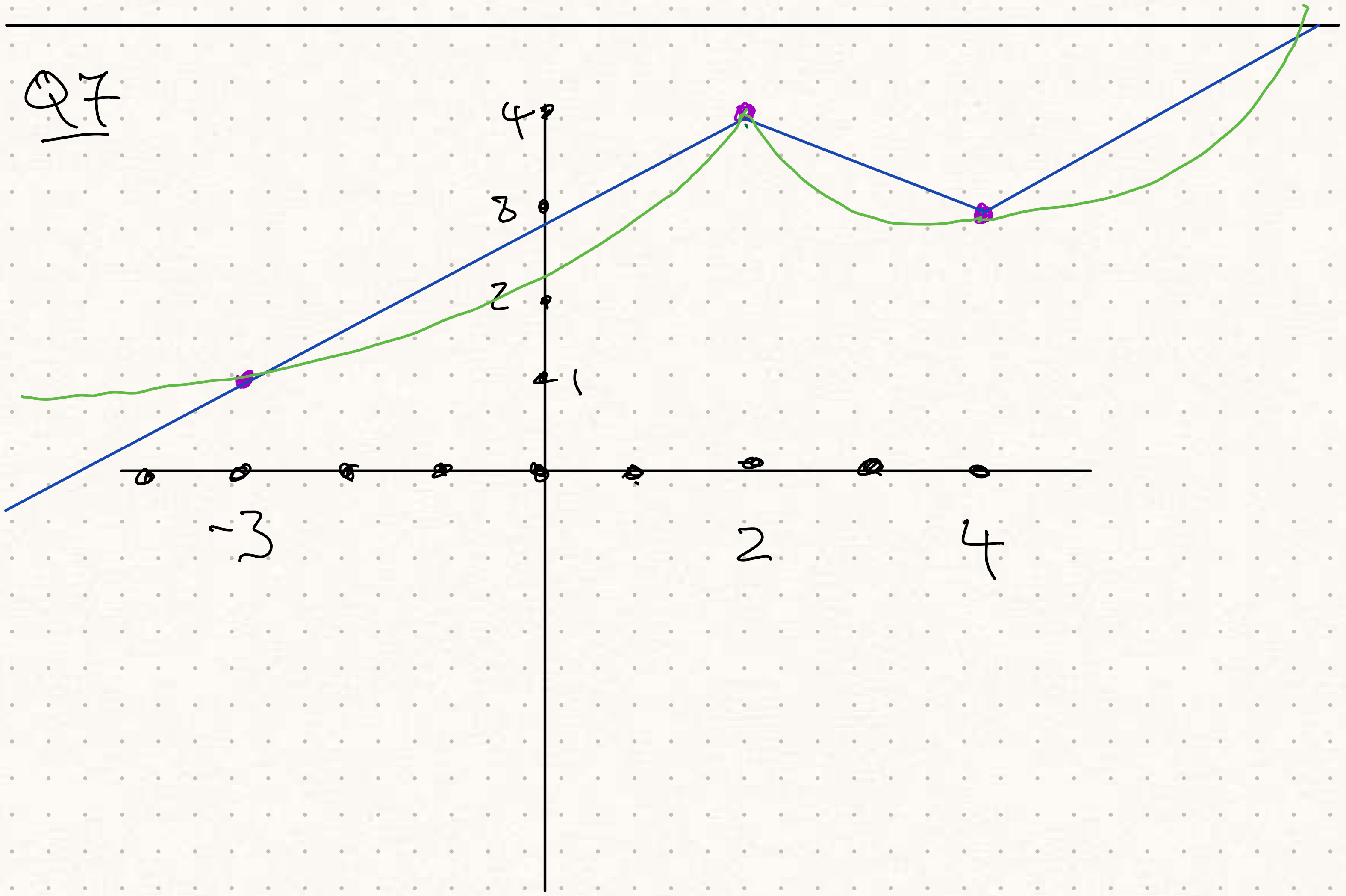
$\iff$ slope decreasing.



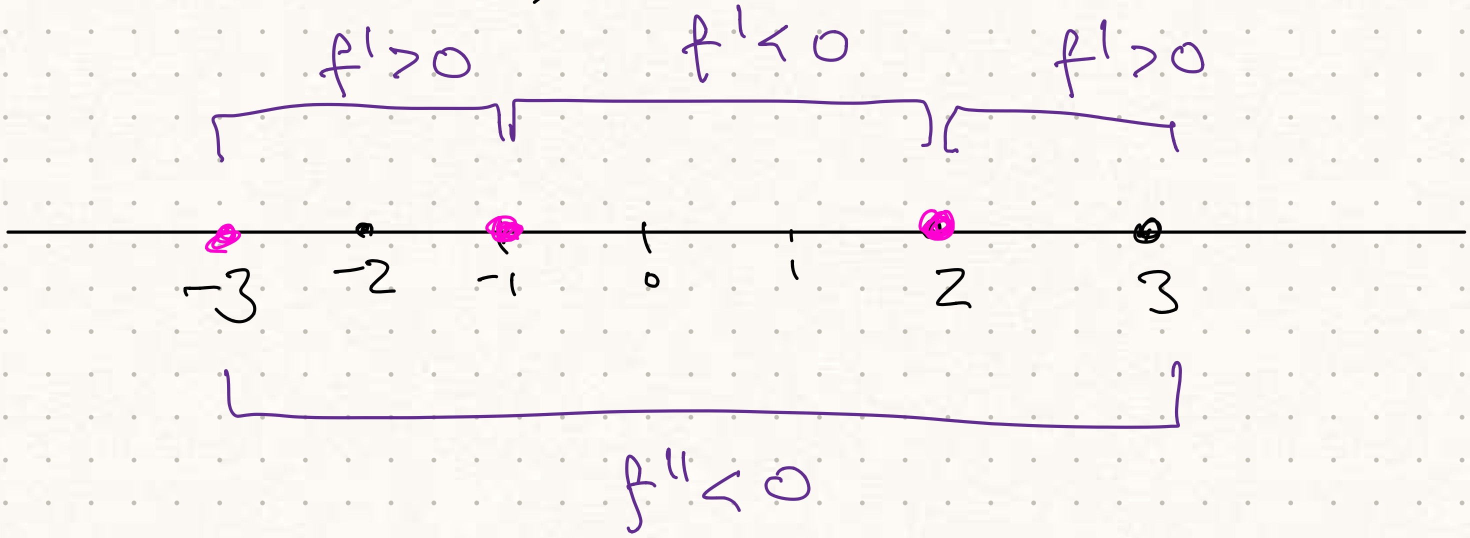
slope increasing

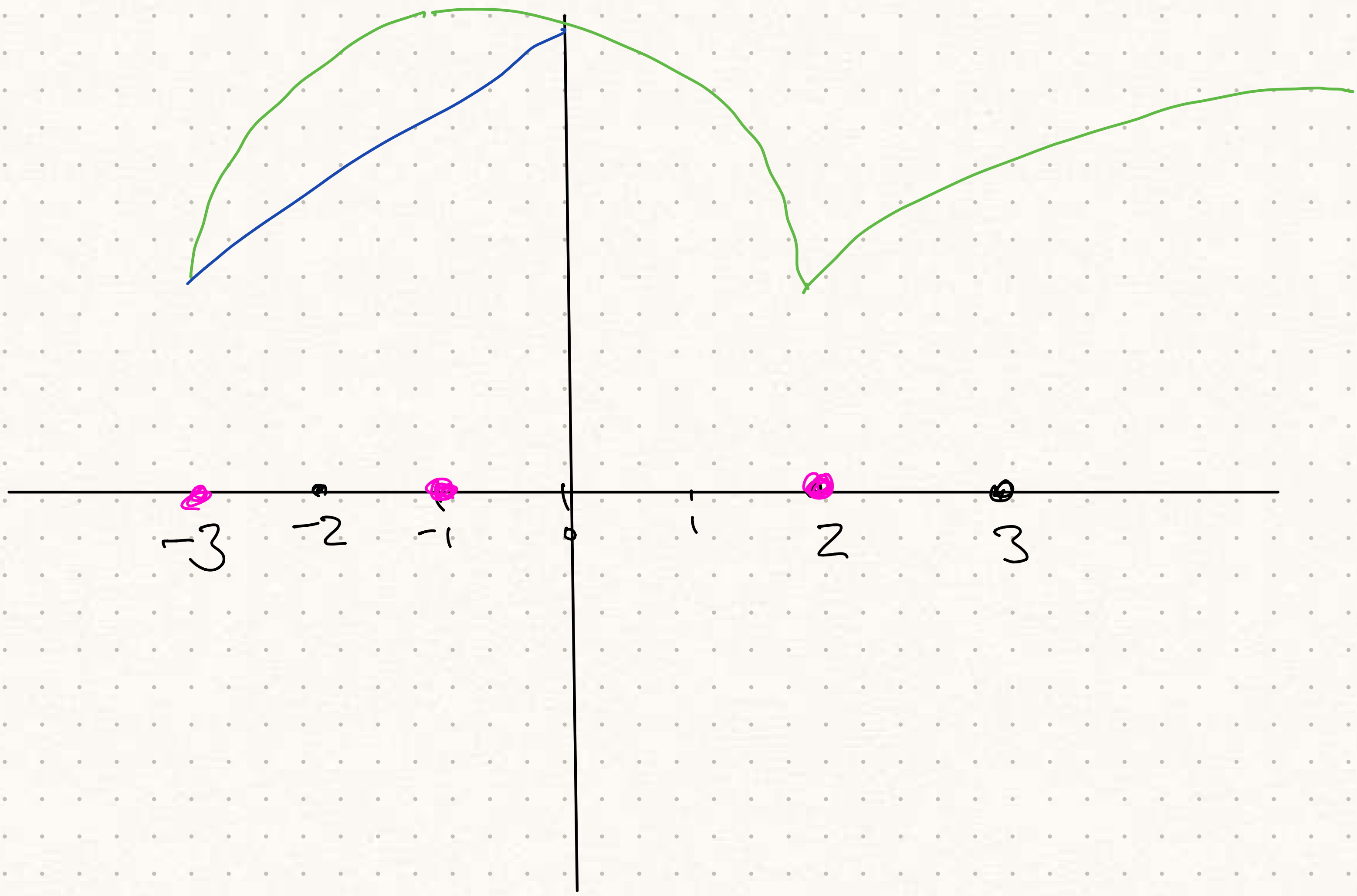
$f'' > 0.$

Q7



217. $f'(\cancel{x}>0)$ on $(2,\infty)$.





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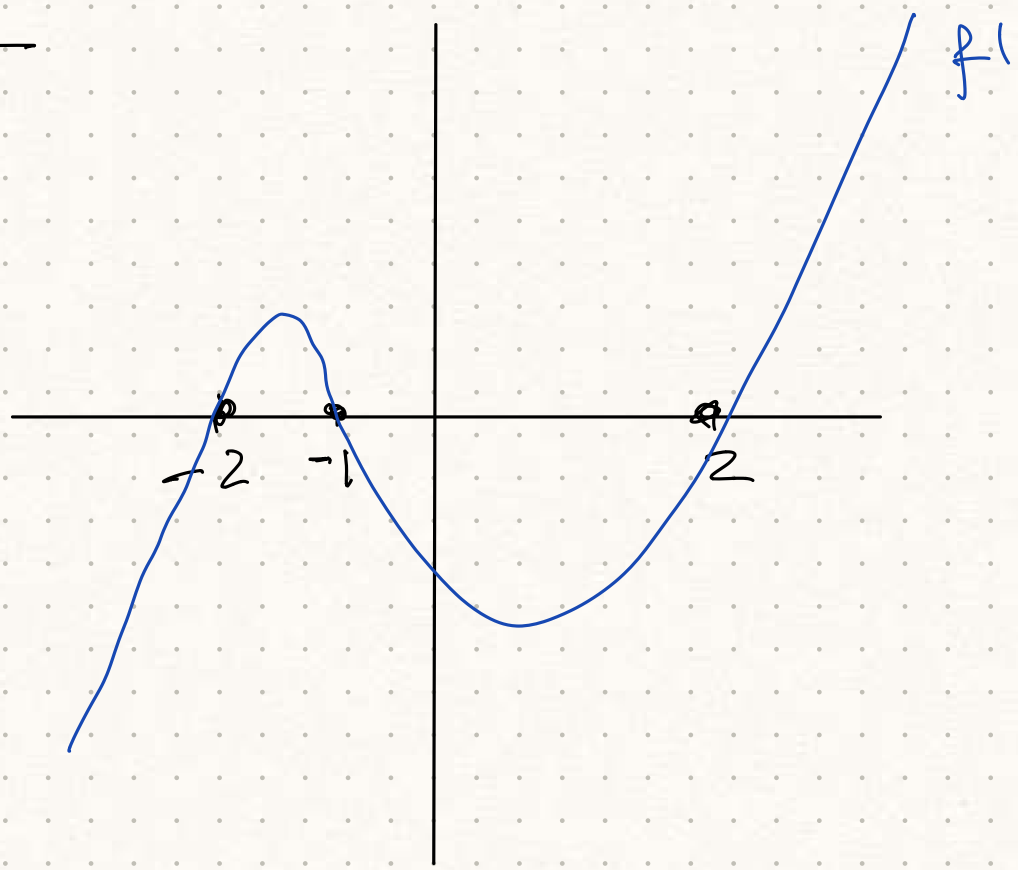


Where is f increasing/ decreasing?

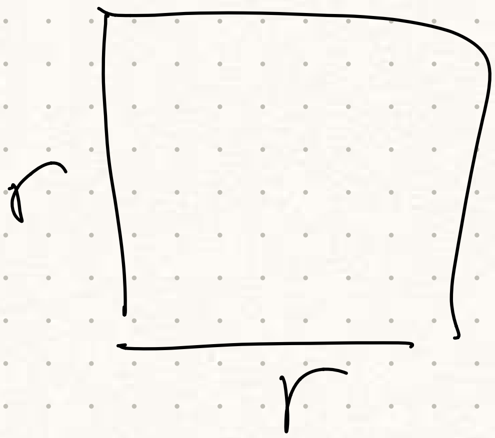
Where is $f' > 0$, $f' < 0$?

$f' > 0$: $(2, \infty)$, $(-2, -1)$

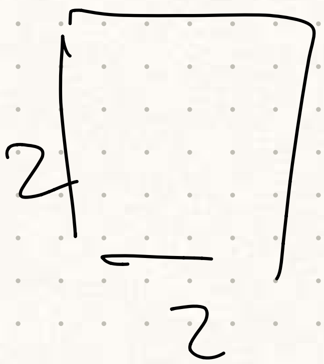
$f' < 0$: $(-\infty, -2)$, $(-1, 2)$.

$f'' > 0 \iff$ concave up

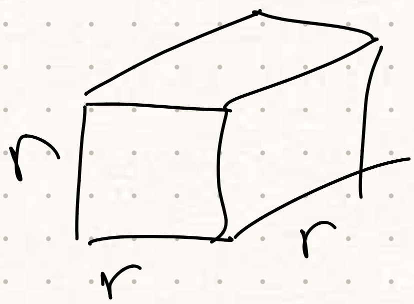
$f'' < 0 \iff$ concave down.



Area = r^2

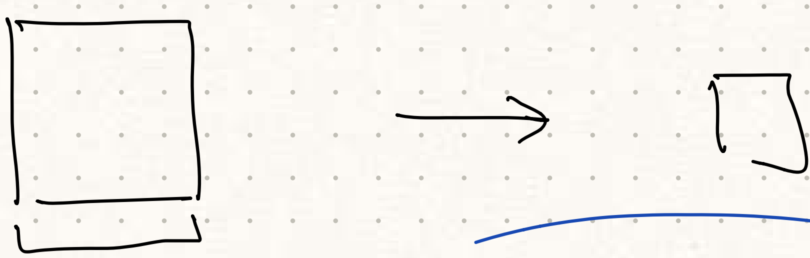


Area = 4



Volume
= r^3

① Draw picture



r = side length of cube

② Write what you're given and what the goal is.

Let V be volume

$$\frac{dV}{dt} = -10$$

decreasing at rate 10

= increasing at rate -10.

Find $\frac{dr}{dt}$ when $r = 2$

③ Relationship between V and r:

$$V = r^3$$

④ Differentiate (apply $\frac{d}{dt}$).

$$\frac{d}{dt}(V) = \frac{d}{dt}(r^3)$$

$$\frac{dV}{dt} = 3r^2 \frac{dr}{dt}$$

⑤.

$$-10 = 12\left(\frac{dr}{dt}\right)$$

So $\frac{dr}{dt} = \frac{-10}{12} = -\frac{5}{6}$