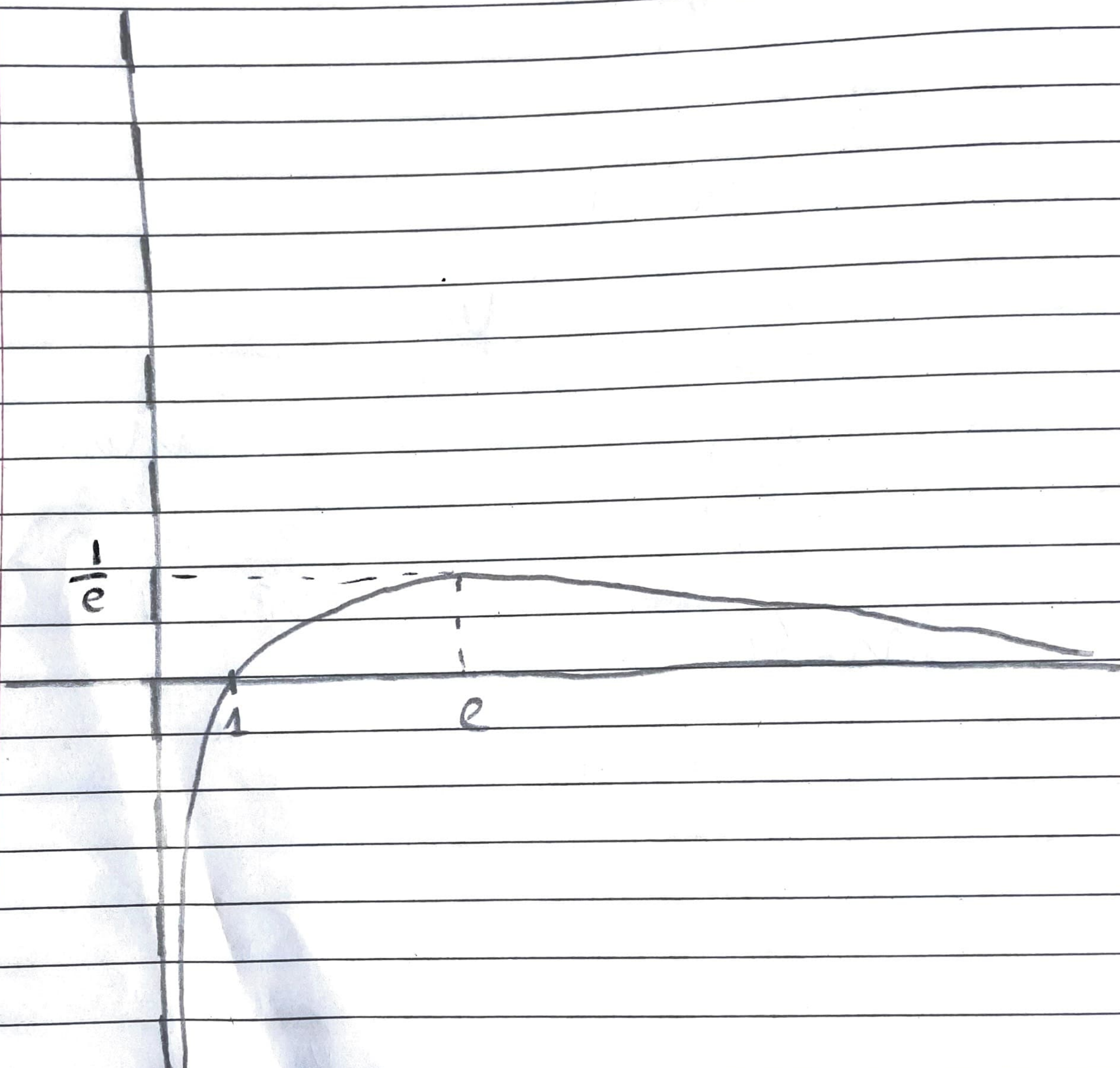
$$h(n) = \frac{\ln n}{n} \quad (n > 0)$$



→ at $n = 0$, $h(n)$ is $\frac{\ln n}{n}$ is undefined.

But $0 \notin D_h$

derivative:

~~$h'(x)$~~= using quotient rule:

$$h'(x) = \frac{\frac{d}{dx}[\ln x]\cdot x - \ln x \cdot \frac{d}{dx}[x]}{x^2}$$

$$= \frac{1 - \ln x}{x^2}$$

$$h'(x) = \frac{1-\ln x}{x^2}$$

~~$h'(x)$ = Point of~~
Stationary point:

$$\frac{1-\ln x}{x^2} = 0$$

$$1 - \ln x = 0$$

$$\ln x = 1$$

$$x = e$$

Therefore, the $h(x)$ is stationary at $x = e$

→ Therefore as x approaches e, the $h(x)$ increases

→ As x increases from e, $h(x)$ decreases as $h'(x)$ becomes negative

IOA $n^m = m^n$

~~n~~

→ take ln on both sides

$$\ln n^m = \ln m^n$$

$$m \ln n = n \ln m$$

$$\frac{\ln n}{n} = \frac{\ln m}{m}$$

~~h(n) =~~

We know:

$$h(m) = \frac{\ln m}{m}$$

$$h(n) = \frac{\ln n}{n}$$

Therefore, $n^m = m^n$ can be written as:

$$h(m) = h(n)$$

→ Using the graph, ~~x~~ $h(n)$ is many-one after ~~x=0~~ $n=1$ and is stationary at $n=e$

Positive integers ~~between~~ between 1 and e: 2

→ At $n=2$:

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

Therefore, the other value of n will be the one that gives $y = \frac{\ln 2}{2}$

$$\frac{\ln n}{n} = \frac{\ln 2}{2}$$
$$2\ln n = n\ln 2$$
$$\ln n^2 = \ln 2^n$$
$$n^2 = \cancel{2}\, 2^n$$

$n=1$:

$1 = 2$ ×

~~$n=2$:~~

$n=3$:

$9 = 8$ ×

$n=4$

$16 = 16$ ✓

~~These~~ Pair of +ve integer values: 2, 4

$\cancel{\boxed{\begin{matrix} m=2 \\ n=4 \end{matrix}}}$

$\boxed{(2,4) \text{ and } (4,2)}$