

$$\textcircled{a} \int_a^b |\Psi(x,0)|^2 dx = 1 \quad \text{or}$$

$$\int_0^a \frac{A^2}{a^2} x^2 dx + \int_a^b \frac{A^2}{(b-a)^2} (b-x)^2 dx = 1$$

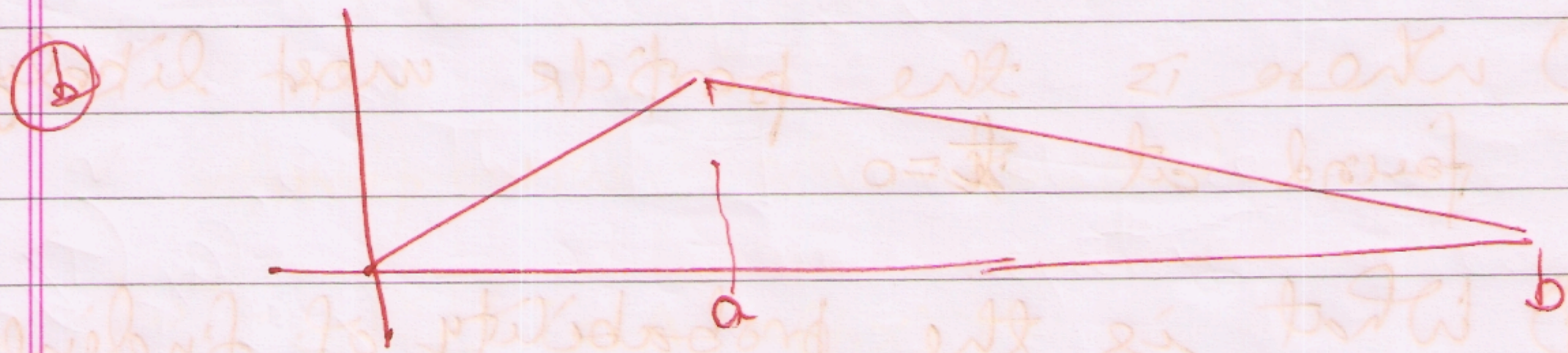
$$\text{or } A^2 \left[\int_0^a \left(\frac{x}{a}\right)^2 dx + \int_a^b \left(\frac{b-x}{b-a}\right)^2 dx \right] = 1$$

if $\frac{x}{a} = y$ $dx = dy \cdot a$	$\frac{b-x}{b-a} = z$, $-dx = (b-a)dz$
$y = 1$ if $x = a$	$z = 1$ if $x = a$
$y = 0$ if $x = 0$	$z = 0$ if $x = b$

$$\Rightarrow A^2 \left[a \int_0^1 y^2 dy + (b-a) \int_1^0 (-1) z^2 dz \right] = 1$$

$$A^2 \left[a \frac{y^3}{3} \Big|_0^1 + (b-a) \frac{z^3}{3} \Big|_1^0 \right] = 1$$

$$\text{or } A^2 \left(\frac{a}{3} + \frac{(b-a)}{3} \right) = 1 \quad \text{or } A = \sqrt{\frac{3}{b}}$$



\textcircled{c} at $t=0$, at $x=a$

\textcircled{d} $1, \frac{1}{2}$ \textcircled{e} $\langle x \rangle = \int_0^b x \Psi(x,0) dx$