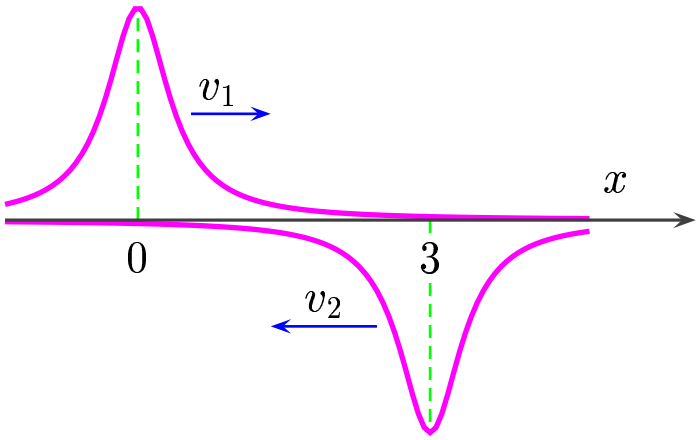
Consider the superposition of two pulses, $y = y_1 + y_2$, where

$$y_1 = \frac{A}{(x - 2t)^2 + 1} \text{ and } y_2 = \frac{-A}{(x + 2t - 3)^2 + 1}$$



The location x_P, where $y = 0$ for all t is

A) $x_P = 0.5$
B) $x_P = 1.0$
C) $x_P = 1.5$
D) $x_P = 2.0$

E) $x_P = 2.5$

$$
\begin{aligned}
y &= y_1 + y_2 \\
&= \frac{A\left[(x+2\,t-3)^2+1-(x-2\,t)^2-1\right]}{\left[(x-2\,t)^2+1\right]\left[(x+2\,t-3)^2+1\right]}
\end{aligned}
$$

for $\quad y = 0\,, \quad$ we have

$$
\begin{aligned}
0 &= (x+2\,t)^2 - 6\,(x+2\,t) + 9 - (x-2\,t)^2\,, \quad \text{so} \\
&= -6\,x + 8\,t\,x - 12\,t + 9\,, \quad \text{so} \\
&= (4\,t-3)\,(2\,x-3)\,, \quad \text{so at all times } \; y = 0 \; \text{ at}
\end{aligned}
$$

$$
x_{_P} = \frac{3}{2}\,.
$$

They have the same speed, so one can also look at the plot and see that $y = 0$ half way between the pulses. Also, at $t = \dfrac{3}{4}\,, \quad y = 0$ at all positions.

Answer **C**.