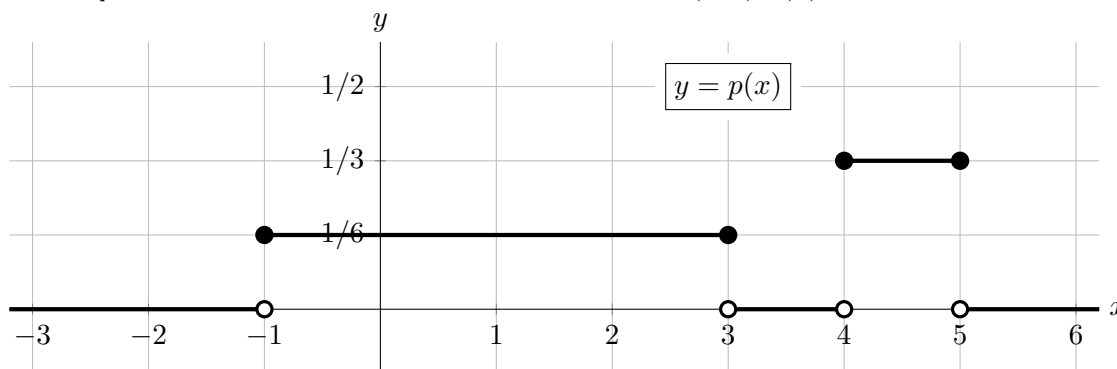


2. [10 points] The graph of a probability density function (pdf) $p(x)$ is shown below.



Note: Your answers to **a.** and **b.** should not include integral signs, variables, or function names.

- a.** [3 points] Find the median value of a quantity with pdf $p(x)$.

Solution: Let T be the median value. Since $\int_{-\infty}^{-1} p(x) dx = 0$ and $\int_{-1}^3 p(x) dx = 2/3$, we see that $-1 < T < 3$. Using rectangles (or $\int_{-1}^T p(x) dx$) we find $0.5 = (1/6)(T - (-1)) = \frac{T+1}{6}$ so $T + 1 = 3$ and $T = 2$.

Answer: The median value is 2

- b.** [3 points] Find the mean value of a quantity with pdf $p(x)$.

Solution:

$$\begin{aligned} \text{mean value} &= \int_{-\infty}^{\infty} xp(x) dx = \int_{-1}^3 \frac{x}{6} dx + \int_4^5 \frac{x}{3} dx = \left. \frac{x^2}{12} \right|_{-1}^3 + \left. \frac{x^2}{6} \right|_4^5 \\ &= \frac{9-1}{12} + \frac{25-16}{6} = \frac{8}{12} + \frac{9}{6} = \frac{13}{6} \end{aligned}$$

Answer: The mean value is $\frac{13}{6}$

- c.** [4 points] If $c(x)$ is the cumulative distribution function corresponding to the pdf function $p(x)$ above, sketch a graph of $y = c(x)$ on the axes below. Pay careful attention to where your graph is differentiable, increasing/decreasing, and concave up/concave down.

