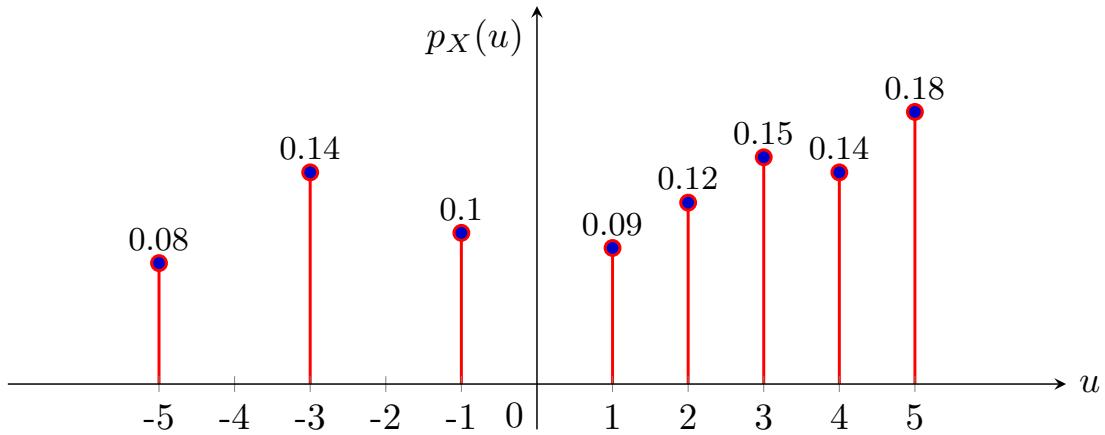
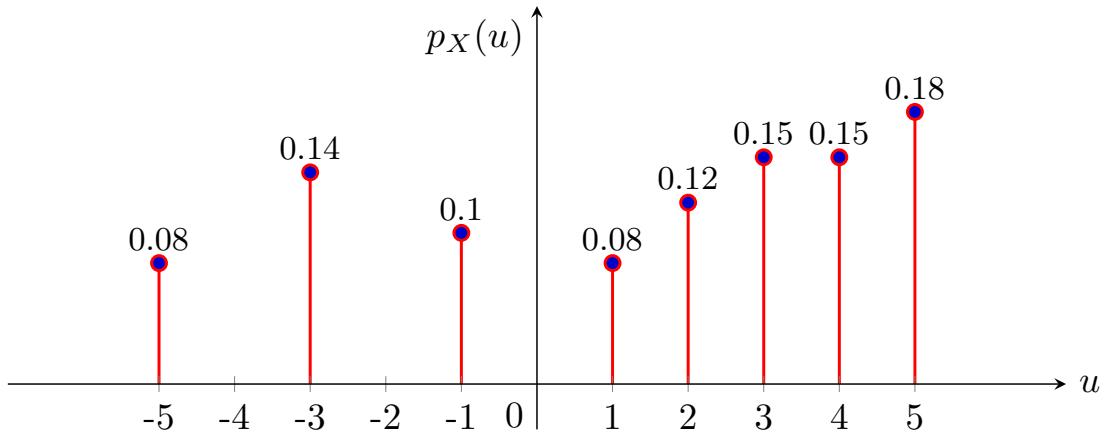


Let X be a discrete random variable, whose probability mass function is shown below. What is the probability that X is 2 or 3, given that $2|X - 1|$ is less than 3?



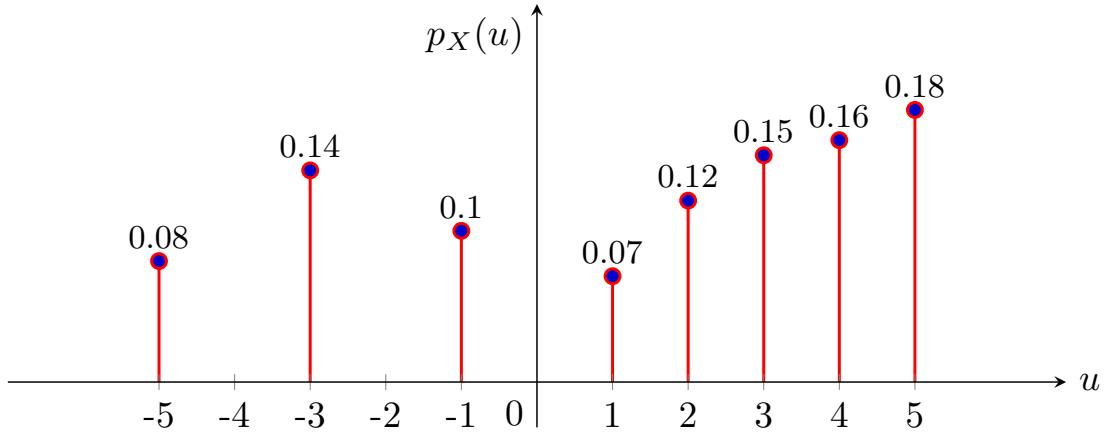
- (a) $4/7$
- (b) $3/7$
- (c) $1/4$
- (d) $9/46$
- (e) 0.21
- (f) 0.27
- (g) 0
- (h) 1
- (i) $1/2$
- (j) None of these

Let X be a discrete random variable, whose probability mass function is shown below. What is the probability that X is 2 or 3, given that $2|X - 1|$ is less than 3 ?



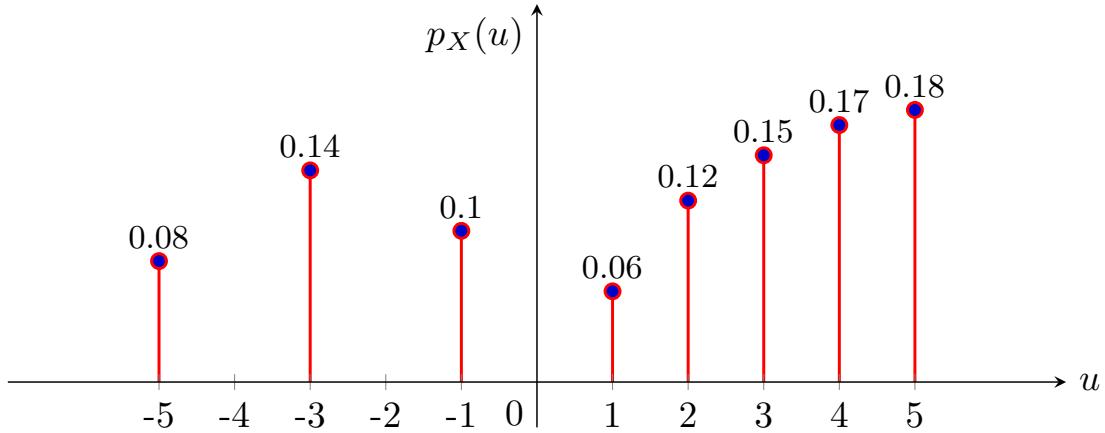
- (a) $3/5$
- (b) $2/5$
- (c) $8/35$
- (d) $8/45$
- (e) 0.2
- (f) 0.27
- (g) 0
- (h) 1
- (i) $1/2$
- (j) None of these

Let X be a discrete random variable, whose probability mass function is shown below. What is the probability that X is 2 or 3, given that $2|X - 1|$ is less than 3 ?



- (a) $12/19$
- (b) $7/19$
- (c) $7/34$
- (d) $7/44$
- (e) 0.19
- (f) 0.27
- (g) 0
- (h) 1
- (i) $1/2$
- (j) None of these

Let X be a discrete random variable, whose probability mass function is shown below. What is the probability that X is 2 or 3, given that $2|X - 1|$ is less than 3 ?



- (a) $2/3$
- (b) $1/3$
- (c) $2/11$
- (d) $6/43$
- (e) 0.18
- (f) 0.27
- (g) 0
- (h) 1
- (i) $1/2$
- (j) None of these

Solution:

$$P(X \in \{2, 3\} \mid 2|X - 1| < 3) = P(X \in \{2, 3\} \mid P(|X - 1| < 3/2)) = P(X \in \{2, 3\} \mid X \in \{1, 2\}) = \frac{p_X(2)}{p_X(1)+p_X(2)}$$

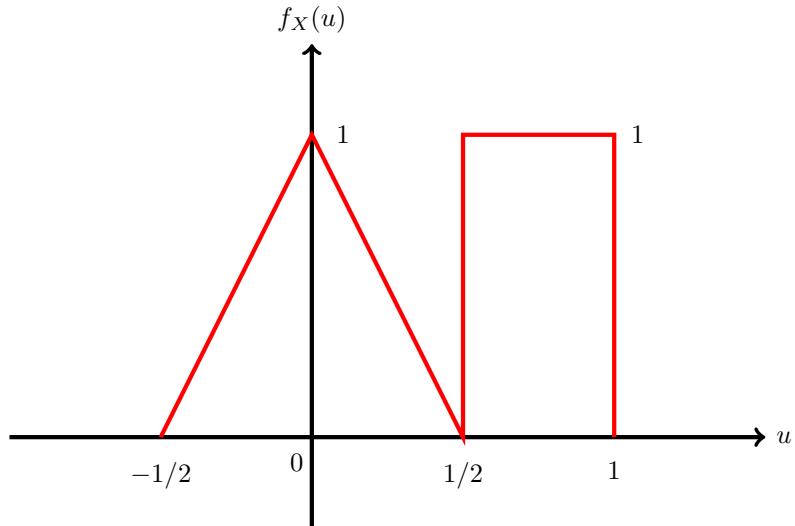
Suppose you flip a fair coin three times and X is the number of Heads you get divided by the sum of the numbers of Heads and Tails you get. What is the expected value of X ?

- (a) $1/2$
- (b) $5/6$
- (c) $3/2$
- (d) $1/3$
- (e) $1/6$
- (f) $2/3$
- (g) 0
- (h) 1
- (i) 2
- (j) 3
- (k) None of these

Solution: Solution:

$$E[X] = \left(\frac{0}{3} \cdot \frac{1}{8}\right) + \left(\frac{1}{3} \cdot \frac{3}{8}\right) + \left(\frac{2}{3} \cdot \frac{3}{8}\right) + \left(\frac{3}{3} \cdot \frac{1}{8}\right) = \frac{3+6+3}{24} = \frac{1}{2}.$$

Let X be a continuous random variable whose probability density function is shown below in red.
What is the expected value of X ?



- (a) $3/8$
- (b) $5/8$
- (c) $1/8$
- (d) $7/8$
- (e) $1/2$
- (f) $1/4$
- (g) $1/9$
- (h) $3/4$
- (i) $1/16$
- (j) $-1/2$
- (k) 1
- (l) 0
- (m) None of these

Solution: Since $uf_X(u)$ is an odd function of u in the interval $[-1/2, 1/2]$, we get

$$E[X] = \underbrace{\int_{-1/2}^{1/2} u f_X(u) du}_{0} + \int_{1/2}^1 u du = (u^2/2) \Big|_{1/2}^1 = 3/8.$$