$$\int_{-2}^{4} 1 + |x-1|\, dx$$

$$\int_{-2}^{4} 1\, dx + \int_{-2}^{4} |x-1|\, dx$$

$$x\Big|_{-2}^{4} + \int_{-2}^{4} |x-1|\, dx$$

$$4-(-2) + \int_{-2}^{4} |x-1|\, dx$$

$$\boxed{6} + \int_{-2}^{4} |x-1|\, dx$$

$|x| \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$

$(x-1) > 0$

$(x-1) < 0$

$|x-1| \begin{cases} (x-1), & x-1 \geq 0, \; x \geq 1 \\ -(x-1), & x-1 < 0, \; x < 1 \end{cases}$

$$\int_{-2}^{1} -(x-1)\, dx + \int_{1}^{4} (x-1)\, dx$$

$$\int_{-2}^{1} -x+1\, dx + \int_{1}^{4} (x-1)\, dx$$

$$-\frac{x^2}{2}\Big|_{-2}^{1} + x\Big|_{-2}^{1} + \frac{x^2}{2}\Big|_{1}^{4} - x\Big|_{1}^{4}$$

$$-\left(\frac{1^2}{2} - \frac{(-2)^2}{2}\right) + \left(1-(-2)\right) + \left(\frac{4^2}{2} - \frac{1^2}{2}\right)$$

$$-(4-1)$$

$$-\left(\frac{1}{2} - \frac{4}{2}\right) + \left(\frac{16}{2} - \frac{1}{2}\right)$$

$$\frac{3}{2} + \frac{15}{2} = \frac{18}{2} = \boxed{9} + 6 = 15 \; u^2$$