$$\langle \chi \rangle = \int_{-8}^{2} |4(x)|^{2} x dx$$

$$\langle \chi \rangle = \int_{-8}^{2} \sin^{2}(\pi x) x dx$$

$$\sin^{2}\theta = \frac{1}{2} (1 - (o_{3}20))$$

$$\langle \chi \gamma = \int_{0}^{2} \frac{\chi}{2} (1 - (o_{5}2\pi x)) dx$$

$$\langle \chi \gamma = \int_{0}^{2} \frac{\chi}{2} dx - \int_{0}^{2} \frac{\chi}{2} (o_{2}\pi x) dx$$

$$(x7 = \int_{0}^{\infty} \frac{x}{2} dx - \int_{0}^{\infty} \frac{x (o 2\pi)}{2} dx$$
Integrate by ports.

du(x) = 1

V = SinZTIX

Expectation Value

(ycx) = x

dV(x) = Cos 217>(

$$\int_{a}^{b} u_{(xx)} dv_{(xx)} dv = \left[u_{(xx)} v_{(xx)} \right]_{a}^{b} - \left[\frac{du_{(xx)}}{dx} v_{(xx)} dx \right] = \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi} \right]_{0}^{2} - \left[\frac{x}{2\pi} \frac{x_{(xx)}}{2\pi} \frac{x_{(xx)}}{2\pi$$

$$\sum_{x \in \mathcal{X}} V(x) dx = \left[x + \sum_{x \in \mathcal{X}} \sum_{x \in \mathcal{X}} \mathcal{X} \right]_{0}^{2}$$

(CX) = Sin(TX)

osasz Sorallothen

$$4x7 = \int_{0}^{3} x dx = \left[\frac{2^{3}}{4}\right]_{0}^{3} = 1$$

$$4$$

$$4$$

$$7$$