

Cambie el orden de integración y evalúe la integral resultante

$$\int_0^2 \int_{y^2}^4 y \cos x^2 dx dy$$

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$$y^2 \leq x \leq 4$$

$$0 \leq y \leq 2$$

$$\sqrt{y^2} \leq \sqrt{x} \leq \sqrt{4}$$

$$0 \leq y \leq 2$$

$$y \leq \sqrt{x} \leq 2$$

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$$0 \leq \sqrt{x} \leq 2$$

$$0 \leq \sqrt{x} \leq 2 \Rightarrow 0 \leq x \leq 4$$

$$\int_0^4 \int_0^{\sqrt{x}} y \cos(x^2) dy dx$$

$$\int y \cos(x^2) dy$$

$$\cos(x^2) \times \int y dy$$

$$\cos(x^2) \times \frac{y^2}{2}$$

$$\frac{\cos(x^2) y^2}{2} \Big|_0^{\sqrt{x}} = \frac{\cos(x^2) \cdot \sqrt{x}^2}{2} - \frac{\cos(x^2) \cdot 0^2}{2} = \frac{\cos(x^2) \cdot x}{2}$$

$$\int \frac{\cos(x^2) \cdot x}{2} dx$$

$$\frac{1}{2} \int \cos(x^2) \cdot x dx$$

$$T = x^2$$

$$\frac{1}{2} \int \frac{\cos(T)}{2} dT$$

$$\frac{1}{2} \cdot \frac{1}{2} \int \cos(T) dT = \frac{1}{4} \int \cos(T) dT = \frac{1}{4} \sin(T) = \frac{1}{4} \sin(x^2) = \frac{\sin(x^2)}{4}$$

$$\frac{\sin(x^2)}{4} \Big|_0^4 = \frac{\sin(4^2)}{4} - \frac{\sin(0^2)}{4} = \frac{\sin(16)}{4}$$