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$$\Rightarrow \frac{d}{dx}\left(x^2 \sin(\pi x)\right) = \frac{d}{dx}\int_0^x f(t)\,dt$$

$$2x\sin(\pi x) + x^2\cos(\pi x)\pi = f(x)$$

$$f(x) = x\left(2\sin(\pi x) + \pi x\cos(\pi x)\right)$$

$$\Rightarrow f(2) = 2\left(2\sin(2\pi) + \pi 2\cos(2\pi)\right)$$

$$= 4\left(0 + \pi\right)$$

$$= 4\pi$$