Name_____ Student ID No._____

This quiz tests your understanding of Fourier Transform (*FT*) and their inverse transforms (FT^{-1}) to real-time signal processing. The table on the next page shows transform pairs relevant to this quiz problem.
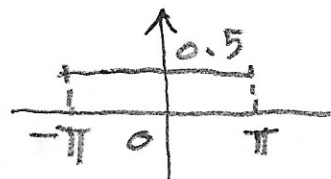
Let y(t)= x(t) * z(t),

where x(t)= 0.5 sinc (π t), z(t)= $sinc^2($ π t/2).

Find y(t). (Hint: It would be helpful to use X(ω) and Z(ω) to find Y(ω) first, then use FT^{-1} to find y(t).

$$Y(\omega) = X(\omega) \cdot Z(\omega)$$

$$X(t) = 0.5\ sinc\ \pi t \longleftrightarrow 0.5\ rect(\omega|2\pi) = X(\omega)$$

$$\beta = \pi$$
$$A = 0.5$$

$$Z(t) = sinc^2\left(\pi \frac{t}{2}\right) \longleftrightarrow \frac{2\pi}{?}\ tri(\omega|\pi)$$

$$T = \pi$$

$$Y(\omega) = X(\omega)\,Z(\omega) = \tfrac{1}{2}Z(\omega),\ \text{for } X(\omega) = \tfrac{1}{2}\ \ -\pi < \omega < \pi$$

thus, $y(t) = z(t) = \tfrac{1}{2} sinc^2\left(\pi \tfrac{t}{2}\right)$

(ans)