

Solution of ECE 315 Test 9 F07

Find the numerical values of the constants in each case.

1. $3 \cos(24\pi t) \xrightarrow{F} A[\delta(f - f_0) + \delta(f + f_0)]$ $A = \underline{\hspace{2cm}}$, $f_0 = \underline{\hspace{2cm}}$
 $3 \cos(24\pi t) \xrightarrow{F} (3/2)[\delta(f - 12) + \delta(f + 12)]$

2. $4 \operatorname{tri}(2(t - 1)) \xrightarrow{F} A \operatorname{sinc}^2(bf) e^{cf}$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$
 $4 \operatorname{tri}(2(t - 1)) \xrightarrow{F} 2 \operatorname{sinc}^2(f/2) e^{-j2\pi f}$

3. $5 \operatorname{rect}(3t) * 2 \operatorname{rect}(t/2) \xrightarrow{F} A \operatorname{sinc}(bf) \operatorname{sinc}(cf)$
 $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$
 $5 \operatorname{rect}(3t) * 2 \operatorname{rect}(t/2) \xrightarrow{F} (20/3) \operatorname{sinc}(f/3) \operatorname{sinc}(2f)$

4. $A \operatorname{tri}(bt) \xrightarrow{F} 7 \operatorname{sinc}^2(4\omega)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$
 $A \operatorname{tri}(bt) \xrightarrow{F} 7 \operatorname{sinc}^2(4(2\pi f)) = 7 \operatorname{sinc}^2(8\pi f)$
 $(7/8\pi) \operatorname{tri}(t/8\pi) = 0.278 \operatorname{tri}(0.0398t) \xrightarrow{F} 7 \operatorname{sinc}^2(8\pi f)$

5. $3 \operatorname{sinc}(10t) * \operatorname{sinc}(4t) \xrightarrow{F} A \operatorname{rect}(bf)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$
 $3 \operatorname{sinc}(10t) * \operatorname{sinc}(4t) \xrightarrow{F} (3/40) \operatorname{rect}(f/10) \operatorname{rect}(f/4) = (3/40) \operatorname{rect}(f/4)$

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Find the numerical values of the constants in each case.

1. $9 \cos(44\pi t) \xrightarrow{F} A[\delta(f - f_0) + \delta(f + f_0)]$ $A = \underline{\hspace{2cm}}$, $f_0 = \underline{\hspace{2cm}}$

$$9 \cos(44\pi t) \xrightarrow{F} (9/2)[\delta(f - 22) + \delta(f + 22)]$$

2. $8 \operatorname{tri}(6(t - 3)) \xrightarrow{F} A \operatorname{sinc}^2(bf) e^{cf}$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$

$$8 \operatorname{tri}(6(t - 3)) \xrightarrow{F} (4/3) \operatorname{sinc}^2(f/6) e^{-j6\pi f}$$

3. $20 \operatorname{rect}(2t) * 5 \operatorname{rect}(t/4) \xrightarrow{F} A \operatorname{sinc}(bf) \operatorname{sinc}(cf)$

$$A = \underline{\hspace{2cm}}$$
 , $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$

$$20 \operatorname{rect}(2t) * 5 \operatorname{rect}(t/4) \xrightarrow{F} 200 \operatorname{sinc}(f/2) \operatorname{sinc}(4f)$$

4. $A \operatorname{tri}(bt) \xrightarrow{F} 3 \operatorname{sinc}^2(9\omega)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$

$$A \operatorname{tri}(bt) \xrightarrow{F} 3 \operatorname{sinc}^2(9(2\pi f)) = 3 \operatorname{sinc}^2(18\pi f)$$

$$(3/18\pi) \operatorname{tri}(t/18\pi) = 0.0531 \operatorname{tri}(0.0177t) \xrightarrow{F} 3 \operatorname{sinc}^2(18\pi f)$$

5. $5 \operatorname{sinc}(4t) * \operatorname{sinc}(3t) \xrightarrow{F} A \operatorname{rect}(bf)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$

$$5 \operatorname{sinc}(4t) * \operatorname{sinc}(3t) \xrightarrow{F} (5/12) \operatorname{rect}(f/4) \operatorname{rect}(f/3) = (5/12) \operatorname{rect}(f/3)$$

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Find the numerical values of the constants in each case.

1. $11 \cos(82\pi t) \xrightarrow{F} A[\delta(f - f_0) + \delta(f + f_0)]$ $A = \underline{\hspace{2cm}}$, $f_0 = \underline{\hspace{2cm}}$

$$11 \cos(82\pi t) \xrightarrow{F} (11/2)[\delta(f - 41) + \delta(f + 41)]$$

2. $13 \operatorname{tri}(7(t + 1)) \xrightarrow{F} A \operatorname{sinc}^2(bf) e^{cf}$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$

$$13 \operatorname{tri}(7(t + 1)) \xrightarrow{F} (13/7) \operatorname{sinc}^2(f/7) e^{j2\pi f}$$

3. $6 \operatorname{rect}(2t) * 12 \operatorname{rect}(t/8) \xrightarrow{F} A \operatorname{sinc}(bf) \operatorname{sinc}(cf)$

$$A = \underline{\hspace{2cm}}$$
 , $b = \underline{\hspace{2cm}}$, $c = \underline{\hspace{2cm}}$

$$6 \operatorname{rect}(2t) * 12 \operatorname{rect}(t/8) \xrightarrow{F} 288 \operatorname{sinc}(f/2) \operatorname{sinc}(8f)$$

4. $A \operatorname{tri}(bt) \xrightarrow{F} 15 \operatorname{sinc}^2(3\omega)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$

$$A \operatorname{tri}(bt) \xrightarrow{F} 15 \operatorname{sinc}^2(3(2\pi f)) = 15 \operatorname{sinc}^2(6\pi f)$$

$$(15/6\pi) \operatorname{tri}(t/6\pi) = 0.796 \operatorname{tri}(0.0531t) \xrightarrow{F} 15 \operatorname{sinc}^2(6\pi f)$$

5. $4 \operatorname{sinc}(3t) * \operatorname{sinc}(8t) \xrightarrow{F} A \operatorname{rect}(bf)$ $A = \underline{\hspace{2cm}}$, $b = \underline{\hspace{2cm}}$

$$4 \operatorname{sinc}(3t) * \operatorname{sinc}(8t) \xrightarrow{F} (1/6) \operatorname{rect}(f/3) \operatorname{rect}(f/8) = (1/6) \operatorname{rect}(f/3)$$