

(32 a)

$$\begin{aligned}
 c. \quad R_x(t_1, t_2) &= E[X(t_1) X(t_2)] \\
 &= E\left[\cos(\underbrace{t_1}_{x} + \theta) \cos(\underbrace{t_2}_{y} + \theta)\right] \quad \text{not: } \cos(x)\cos(y) = \frac{1}{2} \cos(x-y) + \cos(x+y) \\
 &= E\left[\frac{1}{2} \cos(t_1 - t_2) + \frac{1}{2} \cos(t_1 + t_2 + 2\theta)\right] \\
 &= \frac{1}{2} E(\underbrace{\cos(t_1 - t_2)}_{\text{sabit}}) + \frac{1}{2} E[\cos(t_1 + t_2 + 2\theta)] \\
 &= \frac{1}{2} \cos(t_1 - t_2) + \frac{1}{2} \left[\frac{1}{2} \cos(\overset{\theta=0}{t_1 + t_2}) + \frac{1}{2} \cos(\overset{\theta=\pi}{t_1 + t_2 + 2\pi}) \right] \\
 &= \frac{1}{2} \cos(t_1 - t_2) + \frac{1}{4} \cos(t_1 + t_2) + \frac{1}{4} \cos(t_1 + t_2) \\
 &= \frac{1}{2} \cos(t_1 - t_2) + \frac{1}{2} \cos(t_1 + t_2) \\
 &= \frac{1}{2} \left[\cos(\underbrace{t_1}_{x} - \underbrace{t_2}_{y}) + \cos(\underbrace{t_1}_{x} + \underbrace{t_2}_{y}) \right] \quad \cos(x-y) + \cos(x+y) = 2 \cos(x) \cos(y) \\
 &= \frac{1}{2} \cdot 2 \cdot \cos(t_1) \cos(t_2) = \cos(t_1) \cos(t_2)
 \end{aligned}$$

$$\begin{aligned}
 d. \quad C_{xx}(t_1, t_2) &= R_{xx}(t_1, t_2) - \bar{X}_1 \bar{X}_2 \\
 &= \cos(t_1) \cos(t_2)
 \end{aligned}$$