

$$7.4-1. (a) R_A = \frac{3w_0L}{8},$$

$$(b) v(x) = \frac{w_0L^4}{48EI} \left[ -2 \left( \frac{x}{L} \right)^4 + 3 \left( \frac{x}{L} \right)^3 - \left( \frac{x}{L} \right) \right]$$

$$7.4-3. (a) R_A = \frac{w_0L}{10}, v(x) = \frac{w_0L^4}{120EI} \left[ -\left( \frac{x}{L} \right)^5 + 2 \left( \frac{x}{L} \right)^3 - \left( \frac{x}{L} \right) \right],$$

$$(b) \delta_{\max} = \frac{2\sqrt{5} w_0L^4}{1875 EI}, (c) \text{ ————}$$

$$7.4-5. (a) R_A = \frac{3w_0L}{20}, M_A = \frac{-w_0L^2}{30},$$

$$v(x) = \frac{w_0L^4}{120EI} \left[ -\left( \frac{x}{L} \right)^5 + 3 \left( \frac{x}{L} \right)^3 - 2 \left( \frac{x}{L} \right)^2 \right]$$

$$(b) \delta_{\max} = \left| v \left( \frac{-5 + \sqrt{105}}{10} L \right) \right|, (c) \text{ ————}$$

$$7.4-7. (a) R_A = \frac{14}{27} P, R_C = \frac{13}{27} P,$$

$$v_1(x) = \frac{PL^3}{81EI} \left[ 7 \left( \frac{x}{L} \right)^3 - 3 \left( \frac{x}{L} \right) \right],$$

$$(b) \text{ ————}$$

$$7.4-9. R_A = \frac{w_0L}{2} \left[ \left( \frac{a}{L} \right)^4 - 2 \left( \frac{a}{L} \right)^3 + 2 \left( \frac{a}{L} \right) \right],$$

$$v_1(x) = \frac{-w_0x^4}{24EI} + \frac{w_0Lx^3}{12EI} \left[ \left( \frac{a}{L} \right)^4 - 2 \left( \frac{a}{L} \right)^3 + 2 \left( \frac{a}{L} \right) \right] +$$

$$\frac{w_0L^2x^2}{24EI} \left[ -3 \left( \frac{a}{L} \right)^4 + 8 \left( \frac{a}{L} \right)^3 - 6 \left( \frac{a}{L} \right)^2 \right]$$

$$(b) \text{ ————}$$

$$7.4-11. (a) R_A = \frac{-3w_0L}{80}, M_A = \frac{w_0L^2}{160},$$

$$(b) v_1(x) = \frac{w_0L^4}{320EI} \left[ -2 \left( \frac{x}{L} \right)^3 + \left( \frac{x}{L} \right)^2 \right], (c) \text{ ————}$$

$$7.4-13. \text{ See Prob. 7.4-3 answers.}$$

$$7.4-15. R_A = \frac{w_0L}{24}, v(x) = \frac{w_0L^4}{720EI} \left[ -2 \left( \frac{x}{L} \right)^6 + 5 \left( \frac{x}{L} \right)^3 - 3 \left( \frac{x}{L} \right) \right]$$

$$7.4-17. R_A = \frac{48p_0L}{\pi^4} (\pi - 4), M_A = \frac{4p_0L^2}{\pi^4} (24 - 4\pi - \pi^2),$$

$$v(x) = \frac{8p_0L^4}{\pi^4EI} \left[ 2 \cos \left( \frac{\pi x}{2L} \right) + (\pi - 4) \left( \frac{x}{L} \right)^3 + \right.$$

$$\left. (6 - \pi) \left( \frac{x}{L} \right)^2 - 2 \right]$$

$$7.5-1. (a) v(x) = \frac{P_0}{6EI} \left[ \langle x \rangle^3 - 2 \langle x - L/2 \rangle^3 + \langle x - L \rangle^3 \right],$$

$$(b) v(L/2) = \frac{P_0L^3}{48EI}$$

$$7.5-3. (a) \theta(x) = \frac{1}{EI} \left[ 30 \text{ kip} \cdot \text{ft} \langle x \rangle^1 - 9 \text{ kips} \langle x \rangle^2 + \frac{2 \text{ kips}}{3 \text{ ft}} (\langle x \rangle^3 - \langle x - 5 \text{ ft} \rangle^3) - 1 \text{ kip} \langle x - 10 \text{ ft} \rangle^2 \right]$$

$$(b) v(L/2) = 4.50(10^{-3}) \text{ in.}$$

$$7.5-5. (a) \theta(x) = \frac{1}{EI} \left[ -7.8 \text{ kN} \cdot \text{m} \langle x \rangle^1 - \frac{1}{2} \text{ kN} \langle x \rangle^2 + \right.$$

$$\left. \frac{1 \text{ kN}}{3 \text{ m}} \langle x \rangle^3 - \frac{1 \text{ kN}}{36 \text{ m}^2} (\langle x \rangle^4 - \langle x - 3 \text{ m} \rangle^4) - 1 \text{ kN} \langle x - 5.4 \text{ m} \rangle^2 \right]$$

$$(b) v(3\text{m}) = -71.1 \text{ mm}$$

$$7.5-7. (a) \theta_A = \frac{-121w_0L^3}{1944EI}, \theta_D = \frac{137w_0L^3}{1944EI}, (b) \text{ ————},$$

$$(c) v(L/2) = \frac{-163w_0L^4}{7776EI}$$

$$7.5-9. M_0 = \frac{3}{28} PL$$

$$7.5-11. (a) R_A = \frac{w_0L}{10},$$

$$(b) \theta(x) = \frac{w_0}{120EI} \left[ 6L \langle x \rangle^2 - \frac{5}{L} \langle x \rangle^4 - L^3 \langle x \rangle^0 \right]$$

$$7.5-13. (a) R_A = \frac{w_0L}{24},$$

$$(b) \theta(x) = \frac{w_0}{240EI} \left[ 5L \langle x \rangle^2 - \frac{4}{L^2} \langle x \rangle^5 - L^3 \langle x \rangle^0 \right]$$

$$7.5-15. (a) R_A = -\frac{p_0L}{28}, M_A = \frac{p_0L^2}{105},$$

$$(b) \theta(x) = \frac{p_0}{840EI} \left[ 8L^2 \langle x \rangle^1 - 15L \langle x \rangle^2 + \frac{7}{L^3} \langle x \rangle^6 \right]$$

$$7.5-17. (a) R_A = \frac{19}{40} w_0L, M_A = -\frac{73}{960} w_0L^2,$$

$$(b) v(x) = \frac{w_0}{1920EIL} \left[ -73L^3 \langle x \rangle^2 + 152L^2 \langle x \rangle^3 - 80L \langle x \rangle^4 + 32 \langle x - L/2 \rangle^5 + 57L^3 \langle x - L \rangle^2 + 88L^2 \langle x - L \rangle^3 \right]$$

$$7.5-19. (a) R_A = \frac{7w_0L}{32},$$

$$(b) \theta(x) = \frac{w_0}{768EI} \left[ 84L \langle x \rangle^2 - 128 \left( \langle x \rangle^3 - \left\langle x - \frac{L}{2} \right\rangle^3 \right) + 120L \left\langle x - \frac{L}{2} \right\rangle^2 - 3L^3 \langle x \rangle^0 \right]$$

$$(c) \theta_A = -\frac{w_0L^3}{256EI}$$