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3. (a) about \$125. (b) about 5.5 tons. (c) about 5.6 tons. (d) about 10 tons. (e) about 10.5 tons.
5. The demand function is $q = 1280 - 160p$ and the revenue function is $R = pq = 1280p - 160p^2$, whose maximum occurs at $p = \$4.00$; the demand at that price is 640.
7. (a) $q \approx 555.56$. (b) $q \approx 1414.214$. (c) $q = 1600$.
10. (a) $C(q) = 49 + .18q$, $a(q) = \frac{49}{q} + .18$. (b) $q = 480 - 80p$. (c) $R = 480p - 80p^2$. (d) $p = \$3.00$ (e) $p = \$3.09$.
12. Let n be the number of times to order per year. Then the lot size is $\frac{360}{n}$, the number on hand averages $\frac{180}{n}$, and the inventory cost is $C = \frac{180}{n} + 5n + 180$ whose minimum is at $n = 6$. Thus orders should be placed 6 times per year, with lot size 60.
14. Line t_1 has equation $y = a(q_0) + a'(q_0)(q - q_0)$, so has intercept $b = a(q_0) - q_0 a'(q_0)$. Since line t_1 has slope $a'(q_0)$, line t_2 has slope $2a'(q_0)$ and equation $y = 2a'(q_0)q + b = 2a'(q_0)q + a(q_0) - q_0 a'(q_0)$. Hence on t_2 when $q = q_0$, $y = 2a'(q_0)q_0 + a(q_0) - q_0 a'(q_0) = a(q_0) + q_0 a'(q_0)$. Now $a(q) = \dfrac{C(q)}{q}$, so $a'(q) = \dfrac{C'(q)q - C(q)}{q^2}$, so $a'(q_0) = \dfrac{C'(q_0)q_0 - C(q_0)}{q_0^2}$. Hence $y = a(q_0) + q_0 \cdot \dfrac{C'(q_0)q_0 - C(q_0)}{q_0^2} = a(q_0) + C'(q_0) - \dfrac{C(q_0)}{q_0} = C'(q_0)$.
15. (a) $E = -\frac{-3}{47} \approx -.0638$.
17. $E = -\frac{5}{3} \approx -1.6667$.