Homework 9 Solutions

§6.3 8, 19, 20, 21, 22, 24, 25, 28, 31

8/ a) $\frac{dq}{dp} = -kC\,p^{(-k-1)}$

$\Rightarrow E = \frac{-p}{q}\frac{dq}{dp} = \frac{-p}{Cp^{-k}} \cdot -kC\,p^{(-k-1)} = k$

b) $0 < k < 1 \Rightarrow$ Inelastic $\Rightarrow$ should always raise price

c) $k > 1 \Rightarrow$ Elastic $\Rightarrow$ should always reduce price

d) $k = 1 \Rightarrow$ Always unit elasticity. In this case revenue is constant C.

e) None of the above senarios are realistic $\Rightarrow q = Cp^{-k}$ is <u>not</u> a realistic demand function.

19/ a) $\frac{dq}{dp} = -\frac{1}{4} \Rightarrow E = \frac{-p}{q}\cdot\frac{dq}{dp} = \frac{-p}{50 - \frac{p}{4}} \cdot \frac{-1}{4} = \frac{p}{200-p}$

b) $E = 1 \Rightarrow p = 200 - p \Rightarrow p = 100 \Rightarrow q = 25$

Revenue maximized when $q = 25$.

20/ a) $\frac{dq}{dp} = -50 \Rightarrow E = \frac{-p}{q}\cdot\frac{dq}{dp} = \frac{-p}{25000-50p} \cdot -50 = \frac{p}{500-p}$

b) $E = 1 \Rightarrow p = 500 - p \Rightarrow p = 250 \Rightarrow q = 12500$

Revenue maximized when $q = 12500$

21/ a) $\frac{dq}{dp} = -10p \Rightarrow E = \frac{-p}{q}\cdot\frac{dq}{dp} = \frac{-p}{37500-5p^2} \cdot -10p = \frac{2p^2}{7500-p^2}$

b) $E = 1 \Rightarrow 2p^2 = 7500 - p^2 \Rightarrow p = 50 \Rightarrow q = 25{,}000$

Revenue is maximized when $q = 25{,}000$

22/ a) $\frac{dq}{dp} = -20p \Rightarrow E = \frac{-p}{q} \cdot \frac{dq}{dp} = \frac{-p}{48000-10p^2} \cdot -20p = \frac{2p^2}{4800-p^2}$

b) $E=1 \Rightarrow 2p^2 = 4800-p^2 \Rightarrow p = 40 \Rightarrow q = 32000$

Revenue is maximized when $q = 32000$

24/ a) $\frac{dq}{dp} = -\frac{1}{p} \Rightarrow E = \frac{-p}{q} \cdot \frac{dq}{dp} = \frac{-p}{10-\ln(p)} \cdot \frac{-1}{p} = \frac{1}{10-\ln(p)}$

b) $E=1 \Rightarrow 10-\ln(p) = 1 \Rightarrow q = 1$

Revenue is maximized when $q=1$

25/ $\frac{dq}{dp} = -\frac{4}{10}p \Rightarrow E = \frac{-p}{q} \cdot \frac{dq}{dp} = \frac{-p}{400-\frac{2}{10}p^2} \cdot \frac{-4}{10}p = \frac{2p^2}{2000-p^2}$

a) $E(20) = \frac{1}{2} < 1 \Rightarrow$ Inelastic $\Rightarrow$ Should increase price

b) $E(40) = 8 > 1 \Rightarrow$ Elastic $\Rightarrow$ Should decrease price

28/ $\frac{dq}{dp} = -0.13\,A\,p^{-1.13} \Rightarrow E = \frac{-p}{q} \cdot \frac{dq}{dp} = \frac{-p}{A\,p^{-0.13}} \cdot -0.13\,A\,p^{-1.13}$

$\Rightarrow$ Demand is inelastic. $= 0.13 < 1$

31/ $\frac{dq}{dp} = -0.022 \Rightarrow E = \frac{-p}{55.2-0.022p} \cdot -0.022$

a) $E(166.10) \approx 0.071$

b) Very inelastic

c) $E=1 \Rightarrow 0.022p = 55.2 - 0.022p \Rightarrow p = 1255$

The revenue is maximized when $p = \$1255$.