Homework #2

2-12. A company produces circuit boards used to update outdated computer equipment. The fixed cost is $42,000 per month, and the variable cost is $53 per circuit board. The selling price per unit is *p* = $150 − 0.02*D*. Maximum output of the plant is 4,000 units per month. (2.2)

**a.** Determine optimum demand for this product.

**b.** What is the maximum profit per month?

**c.** At what volumes does breakeven occur?

**d.** What is the company’s range of profitable demand?

a) D\* = $\frac{a-Cv}{2b}$ =$\frac{\$150-\$53}{2(0.02)}$ = 2125 units per month

b) [$150 (2425) – 0.02$(2425)^{2}$] – [$42000 + $83(2425)] = 2862.5 (maximum Profit)

c) Total revenue = Total cost (breakeven point)

-b$D^{2}$ + (a- Cv) D – Cf = 0

-0.02$D^{2}$ + ($150- $53) D – 42000 = 0

-0.02$D^{2}$ + 97 D – 42000 = 0

D = $\frac{97\pm [(97)^{2}-4 (-0.02)(-42000)]^{0.5} }{2(0.02)}$

= $\frac{-97+77.7}{-0.04}$ = 483

= $\frac{-97-77.7}{-0.04}$ = 4367.5

d) (483 – 4367.5) Range Profitable

2-13. A local defense contractor is considering the production of fireworks as a way to reduce dependence on the military. The variable cost per unit is $40. The fixed cost that can be allocated to the production of fireworks is negligible. The price charged per unit will be determined by the equation *p* = $180 − *(*5*)D*, where *D* represents demand in units sold per week. (2.2)

**a.** What is the optimum number of units the defense contractor should produce in order to maximize profit per week?

**b.** What is the profit if the optimum numbers of units are produced?

a) D\* = $\frac{a-Cv}{2b}$ =$\frac{\$180-\$40}{2(5)}$ = 14 units per week

b) [$180 (14) – 5$(14)^{2}$] – [$0+ $40(14)] = 980

2-14. A large wood products company is negotiating a contract to sell plywood overseas. The fixed cost that can be allocated to the production of plywood is $900,000per month. The variable cost per thousand board feet is $131.50. The price charged will be determined by *p* = $600 − *(*0.05*)D* per 1,000 board feet. (2.2)

**a.** For this situation determine the optimal monthly sales volume for this product and calculate the profit (or loss) at the optimal volume.

**b.** What is domain of profitable demand during a month?

a) D\* = $\frac{a-Cv}{2b}$ =$\frac{\$600-\$131.50}{2(0.05)}$ = 46850 units per month

b) [$600 (46850) – 0.05$(46850)^{2}$] – [$90000 + $131.50(46850)] = $87,886,900

c) Total revenue = Total cost (breakeven point)

-b$D^{2}$ + (a- Cv) D – Cf = 0

-0.05$D^{2}$ + ($600- $131.50) D – 90000 = 0

-0.02$D^{2}$ + 97 D – 42000 = 0

D = $\frac{-46.50\pm [(46.50)^{2}-4 (-0.05)(-90000)]^{0.5} }{2(0.05)}$

= $\frac{-46.50+126}{-0.01}$ = 8000

= $\frac{-46.50-126}{-0.01}$ = 17250

d) (8000 – 17250) Range Profitable