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**Telecommunications Network Management**

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 **Homework 2**

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**2-11. A large, profitable commercial airline company**

**flies 737-type aircraft, each with a maximum seating**

**capacity of 132 passengers. Company literature states**

**that the economic breakeven point with these aircraft is**

**62 passengers. (2.2)**

**a. Draw a conceptual graph to show total revenue and**

**total costs that this company is experiencing.**

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**b. Identify three types of fixed costs that the airline**

**should carefully examine to lower its breakeven**

**point. Explain your reasoning.**

1. Rent
2. Insurance
3. Loans

These are fixed costs an airline would have to pay. The rent, insurance and loan expenses will remain the same each month. I chose these costs because they will remain fixed for any business including not just an airline so it is a general assumption.

**c. Identify three types of variable costs that can**

**possibly be reduced to lower the breakeven point.**

**Why did you select these cost items?**

1. Aircrew salaries
2. Number of employees
3. Cost of fuel

The variable costs have fluxuations. The cost of labor or aircrew salaries might be too high and maybe they need to reduce it. Also number of employees, maybe you have more people employed then what is necessary. Cost of fuel will vary also with time, a solution could be buying a large amount when the price as at a low.

**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**update outdated computer equipment.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.**

Cf= $42,000 per month

Cv= $53 per circuit board

P = 150 – 0.02D

Max Output = 4000 units per month

$\frac{150-53}{2(0.02)}$ = 2,425 units per month.

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

Profit = Total Revenue – Total Costs =



(150(2425)-0.02(2425)2) – (42,000+53(2425)) = $75,612.50

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

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

 **Break Even : Total Revenue = Total Cost**





**(-0.02D2) + (150-53)D – 42,000 = 0**



$$D=\frac{-97\pm \sqrt{97^{2}-4(-0.02)(-42,000)}}{2(-0.02)}$$

c) Break even points

481 and 4369

d) The domain of profitable demand is 480 – 4369.

**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?**

Cf= $0

Cv= $40 per circuit board

P = 180 – 5D

$\frac{180-40}{2(5)}$ = 14 units per week

**b. What is the profit if the optimum number of units**

**are produced?**

Profit = Total Revenue – Total Costs



(180(14)-5(14)2) – (0+40(14)) = $980 per week

**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 $900,000**

**per 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.**

Cf= $900,000 per month

Cv= $131.50 per circuit board

P = 600 – 0.05D

Max Output = 4000 units per month

$\frac{600-131.5}{2(0.05)}$ = 4685 units per month.

Profit = Total Revenue – Total Costs



(600(4685)-0.05(4685)2) – (900,000+131.5(4685)) = $197,461.25 per month

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

**month?**

**Break Even : Total Revenue = Total Cost**





**(-0.05D2) + (468.5)D – 900,000 = 0**



$$D=\frac{-468.5\pm \sqrt{468.5^{2}-4(-0.05)(-900,000)}}{2(-0.05)}$$

Break even points

**2697.8 and 6672.3**

d) The domain of profitable demand is from **2697.8 – 6672.3.**

**Note: I don’t know how to solve problems 2-15 and 2-16**

**2-15. A company produces and sells a consumer**

**product and is able to control the demand for the**

**product by varying the selling price. The approximate**

**relationship between price and demand is**



**where *p* is the price per unit in dollars and *D* is**

**the demand per month. The company is seeking to**

**maximize its profit. The fixed cost is $1,000 per month**

**and the variable cost (*cv*) is $40 per unit. (2.2)**

**a. What is the number of units that should be produced**

**and sold each month to maximize profit?**

**b. Show that your answer to Part (a) maximizes profit.**

**2-16. An electric power plant uses solid waste for fuel**

**in the production of electricity. The cost *Y* in dollars per**

**hour to produce electricity is *Y* = 12 + 0.3*X* + 0.27*X*2,**

**where *X* is in megawatts. Revenue in dollars per hour**

**from the sale of electricity is 15*X*−0.2*X*2. Find the value**

**of *X* that gives maximum profit. (2.2)**

**2-17. The annual fixed costs for a plant are $100,000,**

**and the variable costs are $140,000 at 70% utilization of**

**available capacity, with net sales of $280,000. What is**

**the breakeven point in units of production if the selling**

**price per unit is $40? (2.2)**

Cf= $100,000

Cv= $140,000

P = 40

Revenue = $280,000



D = $\frac{100,000}{40-140000}$, = -0.7

70% capacity.