Workshop Exercises for Week 4

Attempt the following workshop exercises. These are the exercises that are used in the workshop portion of the internal lectures. No solutions are available for these exercises. Answers to selected workshop exercises are included.

1. The management of a company would like to know the number of units they must sell in order to earn a profit of $150,000. They know that the unit selling price is $25, the variable cost per unit is $15 and the total fixed cost to set up the production is $400,000. How many units do they need to sell?

2. A group of retirees decide to pool their money in order to make a more worthwhile investment. They buy bonds with a technology company to the value of $500,000, which yield 7% per year. They would also like to buy shares in a particular food manufacturing company. The stocks sell at $18 per share and earn a dividend of $0.40 per share per year. How many shares should the retirees buy in order for the total investment in stocks and bonds to yield 6% per year?

3. The demand for goods produced by an industry is given by the equation \( p^2 + q^2 = 169 \), where \( p \) is the price and \( q \) is the quantity demanded. The supply equation is given by \( p = q + 7 \). What are the equilibrium price and quantity?

4. Solve: \(-5 \geq 6(3 - x)\)

5. Solve: \(5 + 0.3x \leq \frac{4 - 3x}{2}\)

6. A company produces a small but important component for a microwave oven, which it then sells to a microwave oven manufacturer. To produce one unit costs the company $3.50 for material and $6.00 for labour. The constant overhead, regardless of the number of components sold is $2000. If the cost at which the company can sell the components to the microwave manufacturer is $12.00, determine the least number of components that they must produce in order to realise a profit.

7. A used car salesman has a choice of two methods of determining his annual income. He can either receive a base salary of $14,000 plus a bonus of 3% of his yearly sales or he can receive a straight 10% commission on his sales. At what level of yearly sales would it be better to choose the second method?

8. Solve: \(|3x + 2| = 5\)

9. Solve: \(|\frac{5x - 1}{7}| \geq 4\)
Answers
1. 55,000 units
2. 7353 stocks
3. $p = 12$, $q = 5$
4. $x \geq \frac{23}{6}$
5. $x \leq -1 \frac{2}{3}$
6. 801 components
7. Yearly sales > $200,000$
8. $x = -\frac{7}{3}$ or 1
9. $x \leq -5 \frac{2}{5}$ or $x \geq 5 \frac{4}{5}$