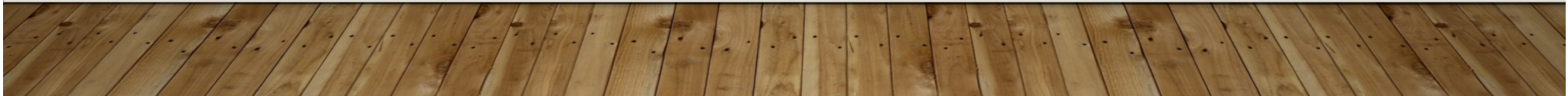# MATHEMATICALLY MODELING A BUSINESS
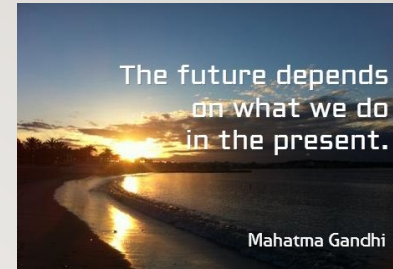
UNIT 4

Statistics are necessary in making business decisions.

- Supply vs demand

- Expense vs revenue and profit

- Breakeven points

The future depends on what we do in the present.

Mahatma Gandhi

Dependence is used in many contexts.

- Fans of football teams depend on their coach to lead the team to victory.

- Voters depend on their elected officials to represent them and bring them a better life.

- In a new business, expenses depend on the demanded quantity of a product.

  o The demand depends on the price of the product.

The transitive property of dependence:

If *x* depends on *y* and *y* depends on *z*, then *x* depends on *z*.

- Expense depends on quantity sold, but quantity sold depends on price of product. Therefore, expense depends on price of product.

```
         Homework = Stress
       Stress = High cholesterol
       High cholesterol = Death
                Thus

       Homework = Death
```

EXAMPLE 1:

Determine the expense, E for production of an item when the price p, is $60 given $E = 50q + 80{,}000$ and $q = 80p + 100{,}000$.

p = \$60;

E = 50q + 80,000

q = 80p + 100,000

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q = 80p + 100,000

q = 80(60) + 100,000

q = 4800 + 100,000

q = 148,000

E = 50q + 80,000

E = 50(148,000) + 80,000

E = 7,400,000 + 80,000

E = 7,480,000

EXAMPLE 2:

Determine the expense, E for production of an item when the price p, is \$35 given $E = 250q + 10,000$ and $q = 20p + 600$.

$p = \$35;$

$E = 250q + 10{,}000$

$q = 20p + 600$

$q = 20p + 600$

$q = 20(35) + 600$

$q = 700 + 600$

$q = 1{,}300$

$E = 250q + 10{,}000$

$E = 250(1{,}300) + 10{,}000$

$E = 325{,}000 + 10{,}000$

$E = 335{,}000$