Math 1030 #13a

Functions: Building Blocks of Mathematical Modeling

Functions
**Mathematical models** are based on relationships between quantities that can change.

**Function** - A mathematical tool that describes relationships between quantities.

Variables - The quantities related by a function

- dependent variable - output variable
- independent variable - input variable

A function describes how a dependent variable changes with respect to one or more independent variables.

**Notation**

\[ y = f(x) \]

read "\( y \) is \( f \) of \( x \)"

- \( f \) is the name of the function
- \( x \) is the independent variable (input)
- \( y \) is the dependent variable (output)

Very specifically says \( x \) is the name of the input and \( y \) is output.

Points will be listed as ordered pairs

\( (x, y) = (\text{input, output}) = (\text{indep. var., dep. var.}) \)
EX 1: Write a statement that describes a possible relationship between the variables.

a) (age, shoe size)

\[
\text{shoe size increases as age increases for about } 0 \leq \text{age} \leq 25
\]

b) (number of hours worked, size of paycheck)

\[
\text{size of paycheck depends on } \# \text{ hrs worked if get paid by the hour}
\]

\[
\text{size of paycheck increases as } \# \text{ of hrs worked increases}
\]

c) (APR, loan balance after 10 years)

\[
\text{APR } = \text{input, loan balance after 10 yrs } = \text{output}
\]

\[
\text{as APR increases, so does loan balance}
\]

d) (Qing's age, the difference of his age and his mother's age)

\[
\text{as Qing's age changes (increases), the difference of his age and his mother's age remains the same (input changes, but output is constant)}
\]

e) (swallows of my drink, liquid left in the bottle)

\[
\text{as the } \# \text{ of swallows increases, liquid left in the bottle decreases (input increases, output decreases)}
\]
EX 2: Your health is a function of many variables. List a few.

\[ \text{output} \]

**inputs:** weight, eating habits, exercise habits, smoking habits, age, genetics, etc.