1 Ch 0, App D: Review

Functions: a rule that assigns to each input \( x \) a unique output \( f(x) \)

Graph of a Function:

set of all points \( (x, y) \) such that \( y = f(x) \)

Combining Functions:

\[ 1/|x| = f(x) \]

\[ (f \cdot g)(x) = f(x) \cdot g(x) \]

Composition:

\[ (f \circ g)(x) = f(g(x)) \]

**Trigonometric Functions** (VERY IMPORTANT FOR ENGINEERS!) See Appendix D and the “Formula Page” (before the Title Page in your text).
Examples: DOMAIN Maplet (simple)
If \( f(x) = \frac{1}{x-1} \) and \( g(x) = \tan x \), find:

a) \( f(g(x)) \)

\[
= f(\tan x) \\
= \frac{1}{\tan x - 1}
\]

b) \( g(f(x)) \)

\[
= \tan \left( \frac{1}{x-1} \right) \\
= \tan \left( \frac{1}{x-1} \right)
\]

(c) \( \frac{f(x+h) - f(x)}{h} \) (and simplify)

\[
= \frac{1}{h} \left( \frac{\frac{1}{(x+h)-1} - \frac{1}{x-1}}{x-1} \right) \\
= \frac{1}{h} \left( \frac{(x-1) - ((x+h)-1)}{(x+h-1)(x-1)} \right) \\
= \frac{1}{x} \left( \frac{x-1 - x-h+1}{(x+h-1)(x-1)} \right) \\
= \frac{-1}{(x+h-1)(x-1)}
\]
On Beyond Average:
DOMAIN Maplet
Solve for $x$: $\sin(2x) = \cos x$

1. $\sin 2x - \cos x = 0$
2. $2 \sin x \cos x - \cos x = 0$
3. $\cos x(2 \sin x - 1) = 0$

Factor:

- $\cos x = 0$
- $2 \sin x - 1 = 0$

Solve for $x$:

- $\sin x = \frac{1}{2}$
- $x = \frac{\pi}{6}, \frac{5\pi}{6} + 2\pi N$

**Note:**

- $2 \sin x \cos x = \cos x$
- $\div \cos x$
- $\cos x \neq 0$

$x = \frac{\pi}{6}, \frac{5\pi}{6} + 2\pi N$