Mathematics for IT 2 — Practice Questions

Functions & Graphing (Week 1)

A. Graphing functions

A1. Graph and compare (tables from $x = -2$ to 2)

Graph each pair on the same axes. After graphing, describe how g is related to f.

1. $f(x) = x, \quad g(x) = x + 3$
2. $f(x) = x, \quad g(x) = x - 4$
3. $f(x) = -2x, \quad g(x) = -2x + 3$
4. $f(x) = x^2, \quad g(x) = x^2 - 2$
5. $f(x) = |x|, \quad g(x) = |x| + 4$
6. $f(x) = x^3, \quad g(x) = x^3 + 2$
7. $f(x) = x^3, \quad g(x) = x^3 - 1$

B. Inverse functions

B1. Find the inverse $f^{-1}(x)$

1. $f(x) = 6x$
2. $f(x) = x^3$
3. $f(x) = \dfrac{x}{2}$

C. Algebra of functions

C1. Difference and domain

Let $f(x) = \dfrac{5}{x}$ and $g(x) = \dfrac{7}{x - 8}$.
(a) Find $(f - g)(x)$ (b) State the domain of $f - g$.

C2. Sums and evaluation

Find $(f + g)(x)$ and $(f + g)(5)$.

1. $f(x) = 3x + 1, \quad g(x) = 2x - 6$
2. $f(x) = 4x + 2, \quad g(x) = 2x - 9$
3. $f(x) = x - 6, \quad g(x) = 2x^2$
4. $f(x) = 4x^2 - x - 3, \quad g(x) = x + 1$

C3. Combined operations

Let $f(x) = x^2 + x$ and $g(x) = x - 5$. Find each:

(a) $(f + g)(4)$

(b) $(f - g)(x)$ and $(f - g)(-3)$

(c) $\left(\frac{f}{g}\right)(x)$ and $\left(\frac{f}{g}\right)(7)$

(d) $(fg)(-2)$

D. Linear functions and slope

D1. Intercepts and graphing

For the line $2x - 4y = 8$:

1. Find the x-intercept.
2. Find the y-intercept.
3. Find one additional checkpoint.
4. Sketch the line using your three points.

D2. Intercepts method (new line)

Graph the line $4x - 3y = 6$ by:

1. Finding the x-intercept.
2. Finding the y-intercept.
3. Plotting a third checkpoint.
4. Drawing the line through the points.

D3. Slope and forms of a line

1. Given two points (x_1, y_1) and (x_2, y_2) with $x_2 \neq x_1$, write the slope formula m and use it to find the slope of the line through $(-4, 5)$ and $(2, -1)$.
2. Write the slope–intercept form of a non-vertical line and identify m and b for $y = 2x - 4$ and for $f(x) = \frac{1}{2}x + 2$.
3. Write the point–slope form of the line with slope m through (x_1, y_1).

D4. Equation from point and slope

Find the equation of the line with slope $m = 7$ passing through $(-4, 5)$. Give your final answer in slope–intercept form.