Problem Set 3: Functions

Key Skills: Domains of Functions, Types of Functions, Properties of Functions

Practice Problems

Domains

Find the domain for each of the following functions. If any values of x are excluded, explain why.

a) $f(x) = \sqrt{x}$ b) $f(x) = \sqrt[3]{x}$ c) $f(x) = \sqrt{x^2}$ d) $f(x) = \sqrt{2x + 2}$

e) $f(x) = \dfrac{1}{x}$ f) $f(x) = \dfrac{5}{x^2}$ g) $f(x) = \dfrac{1+x}{1-x}$ h) $f(x) = \dfrac{1+x}{1-x^2}$

i) $f(x) = \dfrac{e^x}{(2x-5)(x+2)}$ j) $f(x) = \dfrac{1}{e^x}$ k) $f(x) = \dfrac{1}{e^x - 1}$ l) $f(x) = \ln(x)$

m) $f(x) = \ln\left(\dfrac{1}{x}\right)$ n) $f(x) = \ln\left(\dfrac{1}{x^2}\right)$ o) $f(x) = \ln(x^2)$ p) $f(x) = \ln(\sin x)$

Properties of Functions

For each of these functions, determine if it is even, odd, or neither.
Hint: Write down $f(x)$ and $f(-x)$, and graph both of them.

a) $f(x) = 5$ b) $f(x) = \ln(x+2)$ c) $f(x) = e^{x^2}$ d) $f(x) = (e^x)^2$

e) $f(x) = \dfrac{1}{x}$ f) $f(x) = 5x^6$ g) $f(x) = \dfrac{5x^6}{3x^3}$ h) $f(x) = \dfrac{4}{x^2 + 2}$

Answers

Answers: Domains

$a)$ $x \geq 0$ $b)$ all $\mathbb{R}$ $c)$ all $\mathbb{R}$ $d)$ $x \geq -1$

$e)$ $x \neq 0$ $f)$ $x \neq 0$ $g)$ $x \neq 1$ $h)$ $x \neq \pm 1$

$i)$ $x \neq \dfrac{5}{2}$ and $x \neq -2$ $j)$ all $\mathbb{R}$ $k)$ $x \neq 0$ $l)$ $x > 0$

$m)$ $x > 0$ $n)$ $x \neq 0$ $o)$ $x \neq 0$ $p)$ all $\mathbb{R}$

Answers: Properties of Functions

a) even. b) neither. c) even. d) neither. e) odd. f) even. g) odd. h) neither.