

Exercises 3.1, Mathematics 1 (12-PHY-BIPMA1)
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1. Find the domain and the range of the following functions:

(a) $f(x) = \frac{1}{1+x}$,

(b) $f(x) = \sqrt{x} - \sqrt{x-1}$,

(c) $f(x) = \frac{1}{\sqrt{1+x^2}}$,

(d) $f(x) = \sin x$,

(e) $f(x) = \tan x$.

2. Find formulas for the following implicitly defined functions. What are their domains and ranges?

(a) $y = f(x)$ is the solution of equation $x^3y + 2y = 5$,

(b) $y = f(x)$ is the largest solution of equation $y^2 = 3x^2 - 2xy$,

(c) $y = f(x)$ is the solution of equation $2x + 2xy + y^2 = 5$ which satisfies $y > -x$.

3. A function f is given which satisfies $f(2x + 3) = x^2$ for all $x \in \mathbb{R}$. Compute

(a) $f(0)$,

(b) $f(3)$,

(c) $f(x)$,

(d) $f(y)$,

(e) $f(f(2))$.

4. What is the limit of the following sequence?

$$\lim_{n \rightarrow \infty} 8^{\frac{n+1}{3n+2}}.$$

Justify your answer.