sets.exe Exercises for Chapter sets

Exercise sets.hardhat

For the following, write the set described in set-builder notation.

a. $A = \{2, 3, 5, 9, 17, 33, \cdots\}$.
b. B is the set of integers divisible by 11.
c. $C = \{1/3, 1/4, 1/5, \cdots\}$.
d. D is the set of reals between -3 and 42.

Exercise sets.2

Let $\mathbf{x}, \mathbf{y} \in \mathbb{R}^n$. Prove the *Cauchy-Schwarz Inequality*

$$|\mathbf{x} \cdot \mathbf{y}| \leqslant \|\mathbf{x}\|\|\mathbf{y}\|. \tag{1}$$

Hint: you may find the geometric definition of the dot product helpful.

Exercise sets.3

Let $\mathbf{x} \in \mathbb{R}^n$. Prove that

$$\mathbf{x} \cdot \mathbf{x} = \|\mathbf{x}\|^2. \tag{2}$$

Hint: you may find the geometric definition of the dot product helpful.

Exercise sets.4

Let $\mathbf{x}, \mathbf{y} \in \mathbb{R}^n$. Prove the *Triangle Inequality*

$$\|\mathbf{x} + \mathbf{y}\| \leqslant \|\mathbf{x}\| + \|\mathbf{y}\|. \tag{3}$$

Hint: you may find the Cauchy-Schwarz Inequality helpful.

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