

Exercise walk-through

1.1

Change in Tandem

AP Precalculus

Functions, and change in tandem

A **function** maps each input to **exactly one** output. Inputs form the **domain**; outputs the **range**.

- **increasing** :
 $a < b \Rightarrow f(a) < f(b)$
- **decreasing** :
 $a < b \Rightarrow f(a) > f(b)$



Bridge curve

The vocabulary every function question uses

a function

a rule mapping each input to **exactly one** output

domain
range

and

the allowed inputs, and the outputs they produce

independent
pendent

/ de-

the input you choose, and the output it determines

local extremum

a value larger (or smaller) than everything **nearby**

global maxi-
mum

larger than everything **in the whole domain** – a local one need not be global

piecewise-defined

different rules over non-overlapping intervals; pick the branch whose interval contains your input

“Exactly one output” is the whole definition, and it is what the vertical-line test checks on a graph.

The words a function question uses

Independent and dependent

The **independent variable** is the input, plotted horizontally; the **dependent variable** is the output that follows.

Global (absolute) maximum

A **global (absolute) maximum** is the largest output anywhere in the domain; a **local (relative) extremum** is largest or smallest only nearby.

Piecewise-defined function

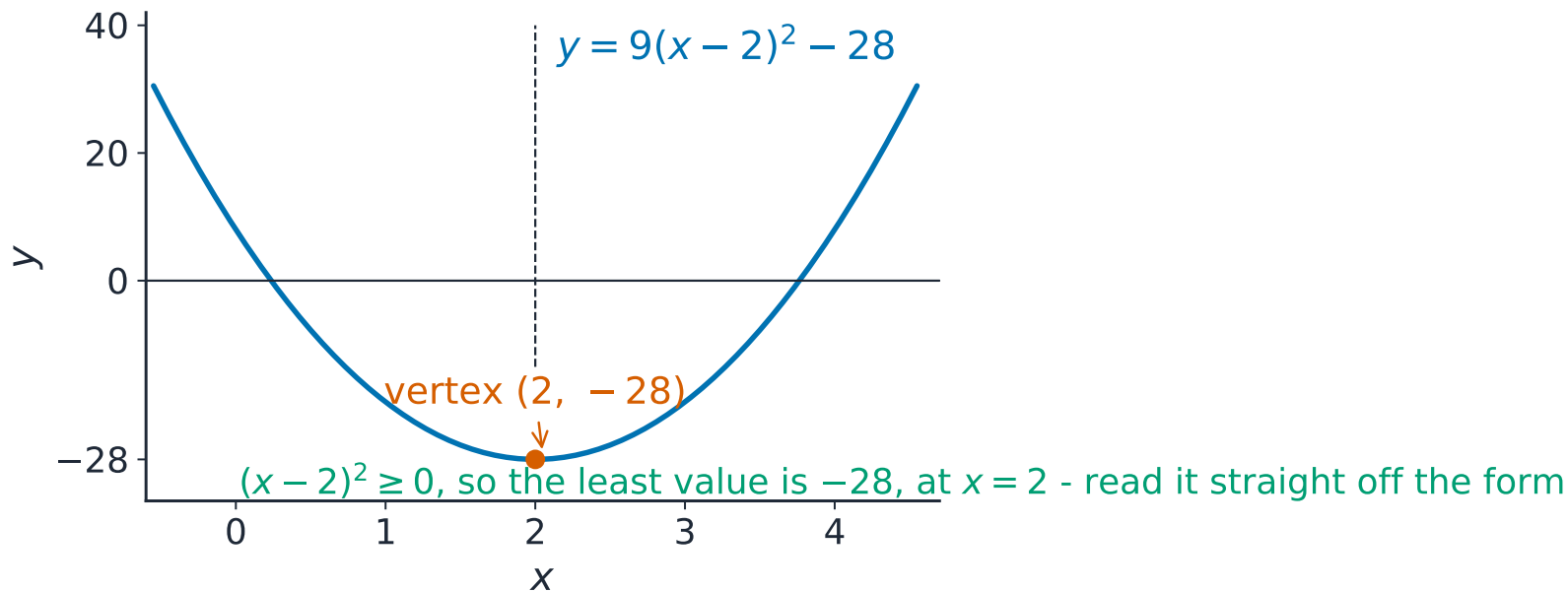
A **piecewise-defined function** uses a different rule on each interval – so check the endpoints, where the rules meet.

Increasing and decreasing

Say over *which interval*: a function is rarely increasing everywhere, and the interval is part of the answer.

Describe a graph in this order: domain and range, increase and decrease, extrema, end behaviour.

Completing the square gives the vertex of a parabola



Completing the square gives the vertex of a parabola

Average rate of change

The **average rate of change** over $[a, b]$ is the **slope of the secant line** :

$$\text{avg rate} = \frac{f(b) - f(a)}{b - a}.$$

Positive rate: both quantities move the **same** way. **Negative**: opposite ways.

$$f(x) = x^2$$

Over $[1, 4]$: $\frac{16 - 1}{3} = 5$.

Over $[1, 2]$: $\frac{4 - 1}{1} = 3$. The rate **itself changes** – which is exactly why f is not linear.

Exercises 2.1·2.3

2.1 Define a function.

[1]

2.2 State the difference between the domain and the range.

[2]

2.3 For $f(x) = 2x + 1$, find $f(3)$.

[1]

Exercises 2.1·2.3

2.1 Define a function.

[1]

2.1

- a relation that maps each input value to exactly one output value
-

2.2 State the difference between the domain and the range.

[2]

2.2

- the domain is the set of input values; the range is the set of output values
-

2.3 For $f(x) = 2x + 1$, find $f(3)$.

[1]

2.3

- $f(3) = 2(3) + 1 = 7$

Exercises 3.1-3.2

3.1 A function maps each input to

[1]

☐

A many outputs

B exactly one output

C no output

D two outputs

☐

3.2 The set of input values of a function is its

[1]

A range

B domain

C rule

D graph

Exercises 3.1-3.2

3.1 A function maps each input to

[1]

☐

A many outputs

B exactly one output

C no output

D two outputs

3.1 B

- exactly one output.

3.2 The set of input values of a function is its

[1]

☐

A range

B domain

C rule

D graph

3.2 B

- domain.

Exercise 3.3 (a)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(a) Find $f(2)$.

[1]

Exercise 3.3 (a)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(a) Find $f(2)$.

[1]

(a)

- $f(2) = 4$

Exercise 3.3 (b)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(b) State the range.

[1]

Exercise 3.3 (b)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(b) State the range.

[1]

(b)

- $\{1, 4, 9\}$

Exercise 3.3 (c)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(c) Name the independent variable.

[1]

Exercise 3.3 (c)

3.3 $f(x) = x^2$ for x in $\{1, 2, 3\}$.

(c) Name the independent variable.

[1]

(c)

- x