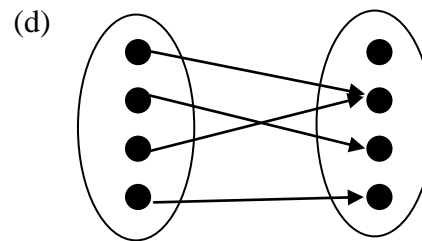
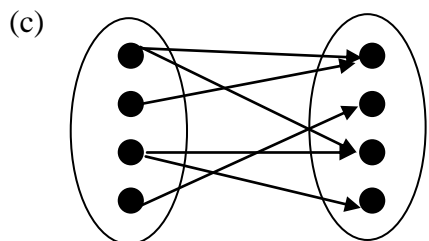
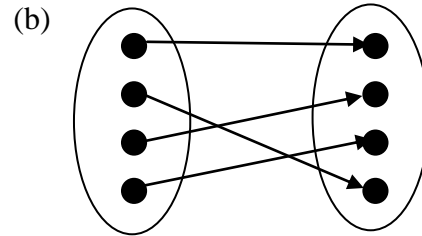
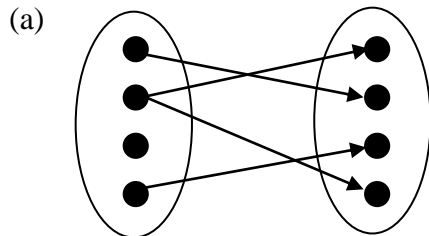


Section 1: Functions, graphs and transformations

Exercise level 1

1. For each of the mappings below:
- Describe the mapping as either; one-to-one, many-to-one, one-to-many or many-to-many.
 - State whether the mapping is a function or not.



2. For each of the mappings described:
- Draw a mapping diagram.
 - Describe the mapping as either; one-to-one, many-to-one, one-to-many or many-to-many.
 - State whether the mapping is a function or not.
 - 'is a prime factor of' with domain $\{2, 3, 5, 7\}$ and range $\{6, 10, 21, 23\}$
 - 'is $\frac{1}{3}$ of' with domain $\{1, 2, 3, 4\}$ and range $\{3, 6, 9, 12\}$
 - 'is the number of factors of' with domain $\{1, 2, 3, 4\}$ and range $\{8, 9, 10, 11\}$

3. Find the range of each of the following functions.

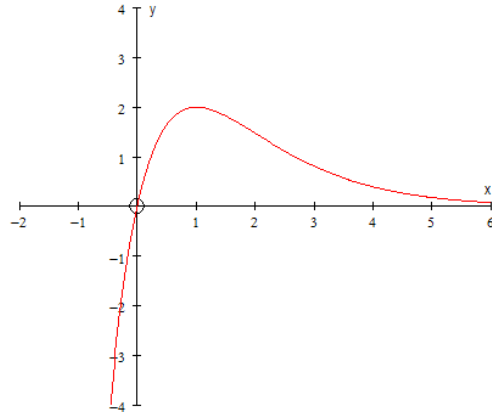
- $f(x) = 1 - 3x$ where $x > 0$
- $f(x) = x^2$ where $x \in \mathbb{R}$
- $f(x) = \frac{1}{1+x^2}$ where $-1 \leq x \leq 1$

4. Find the range of each of the following functions.

- $f(x) = (x+3)^2$ where $x \in \mathbb{Q}^+$
- $f(x) = 3\sqrt{x} - 9$ where $x \in \mathbb{R}, 0 \leq x < 100$
- $f(x) = \sin x$ where $x \in \mathbb{R}$
- $f(x) = e^x$ where $x \in \mathbb{R}$
- $f(x) = \ln x$ where $x \in \mathbb{R}^+$
- $f(x) = \cos^2 x$ where $x \in \mathbb{R}$

Edexcel A level Maths Functions 1 Exercise

5. The diagram below shows the graph of a function $f(x)$.
The graph passes through the origin and has a turning point at $(1, 2)$.



Sketch the following graphs, giving the coordinates of the turning point in each case.

- $y = f(x+2)$
 - $y = f(3x)$
 - $y = f(x-1) + 2$
 - $y = f(-x)$
 - $y = -2f(x)$
 - $y = f\left(\frac{1}{2}x - 1\right)$
6. The graph $y = x^2$ undergoes the following transformations. Find the equation of the new graph in the form $y = ax^2 + bx + c$ in each case (starting with $y = x^2$ in each part).

- Translation through $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$
- Stretch parallel to the x -axis, scale factor $\frac{1}{2}$
- Reflection in the y -axis
- Stretch parallel to the y -axis, scale factor 3
- Translation through $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$ followed by reflection in the x -axis
- Stretch parallel to the y -axis, scale factor 2, followed by translation through $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$, followed by reflection in the y -axis.