Supervision Instructions

Mathematics Methods (Unit 1-2)
Task #3
25th May 2021 – Period 6

Task consists of two papers: **Paper 1** and **Paper 2**. Students will have access to only one paper at a time.

Paper 1:
- 15 minutes
- Calculator is not allowed

After 15 minutes **Paper 1** is to be collected and **Paper 2** will be given.

Paper 2:
- 25 minutes
- Calculator is allowed

After 25 minutes **Paper 2** is to be collected.

Check that students put their names.

Name: Marks:

Question 1

    a. Sketch $f:(0,5] \to R, f(x) = x^2 - 2x + 5$, and find its Range   3 marks
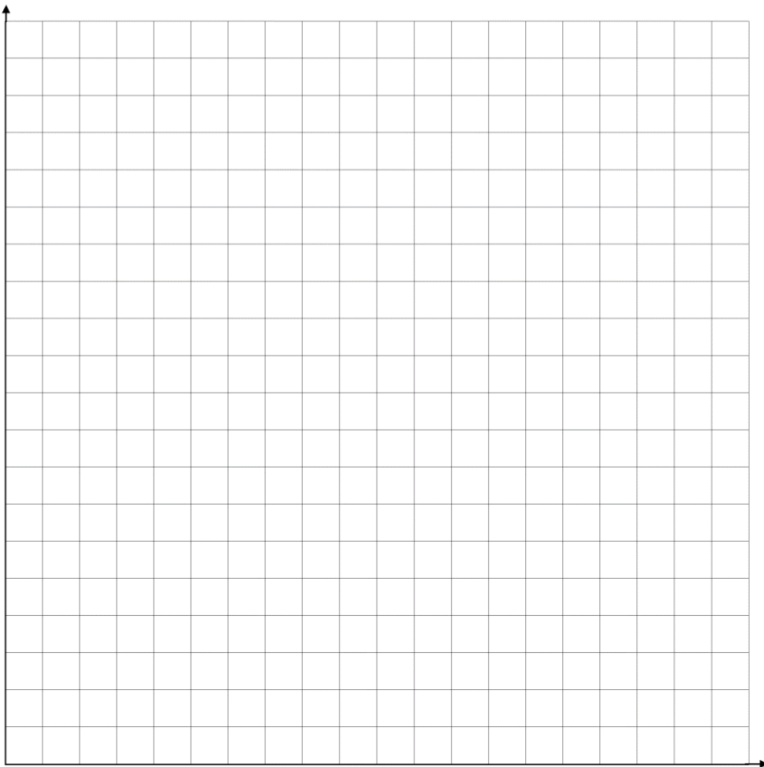
    b. State the type of correspondence of the graph.   1 mark

Question 2

Describe a sequence of transformations applied to the graph of $y = x^2$ to obtain

2 marks
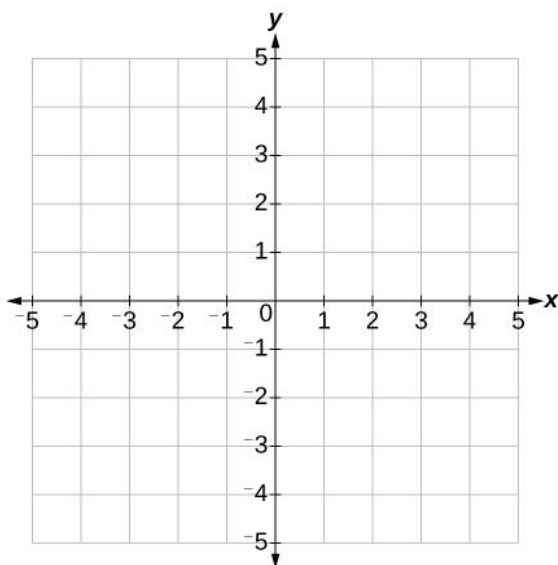
$$y = -\left(\frac{x}{2} - 1\right)^2 - 3.$$

Question 3

1 mark

Find a greatest possible domain for $f:[-3,3] \to R, f(x) = \sqrt{9 - x^2}$ so that f^{-1} exists.

Question 4

1+2 marks

   a. Sketch the graph of $f:[1,\infty) \to R, f(x) = (x-1)^2 - 2$.

   b. Find the inverse function, and hence sketch it on the same axes

Name: Marks – Section 1:   Section 2:

SECTION 1

| **Instructions for Section 1** |
| --- |
| Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions. |
| Choose the response that is **correct** for the question. |
| A correct answer scores 1, an incorrect answer scores 0. |
| Marks will **not** be deducted for incorrect answers. |
| No marks will be given if more than one answer is completed for any question. |

Question 1

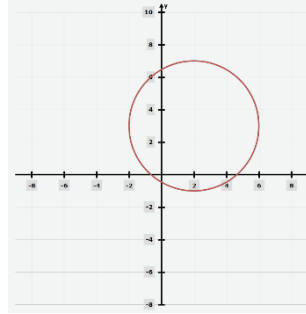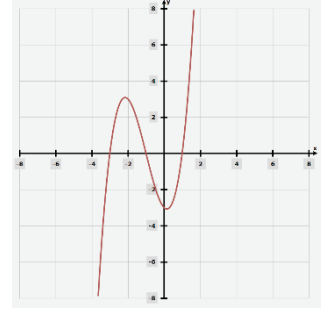Which of the following is a **false** statement for the below graphs;
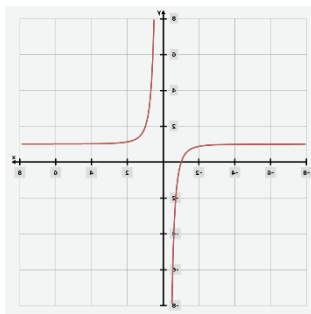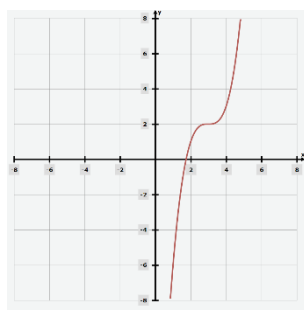
| I. | II. | III. | IV. |

A   III has many to many correspondence

B   Only II and IV are functions

C   Inverses exist for graphs of I and II.

D   IV has many to one correspondace

E   Domain of II and IV is $(-\infty, \infty)$

Question 2

If $g : (-\infty, 3) \to R, g(x) = \dfrac{1}{\sqrt{6-2x}}$, inverse of $g(x)$ is;

A $\quad g^{-1} : (0, +\infty) \to R, g(x)^{-1} = 3 - \dfrac{1}{2x^2}$

B $\quad g^{-1} : (-\infty, 3) \to R, g(x)^{-1} = 3 - \dfrac{1}{2x^2}$

C $\quad g^{-1} : (-\infty, 3) \to R, g(x)^{-1} = \dfrac{1}{(6-2x)^2}$

D $\quad g^{-1} : R / \{0\} \to R, g(x)^{-1} = 3 - \dfrac{1}{2x^2}$

E $\quad g^{-1} : (-\infty, 0) \to R, g(x)^{-1} = \sqrt{6 - \dfrac{x}{2}}$

Question 3

The maximal domain of $f(x) = \dfrac{x}{\sqrt{9x+45}} + \dfrac{1}{x}$ is;

A $\quad [-5, \infty) \backslash \{0\}$

B $\quad \{-5, 0\}$

C $\quad R \backslash \{-5, 0\}$

D $\quad (-5, \infty) \backslash \{0\}$

E $\quad [-5, 0]$

Question 4

The equation of the graph shown is likely to be:

A $\quad y = -\dfrac{2}{(x-2)^2} - 1$

B $\quad y = 1 - \dfrac{2}{(x+2)^2}$

C $\quad y = -\dfrac{2}{(x+1)^2} - 2$

D $\quad y = \dfrac{2}{(x+2)^2} - 1$
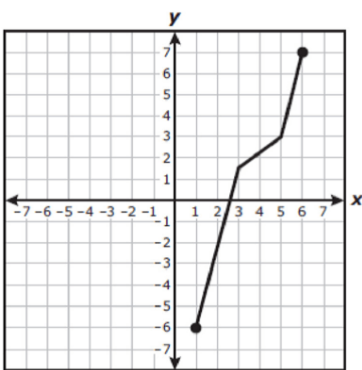
E $\quad y = -\dfrac{2}{(x+2)^2} - 1$
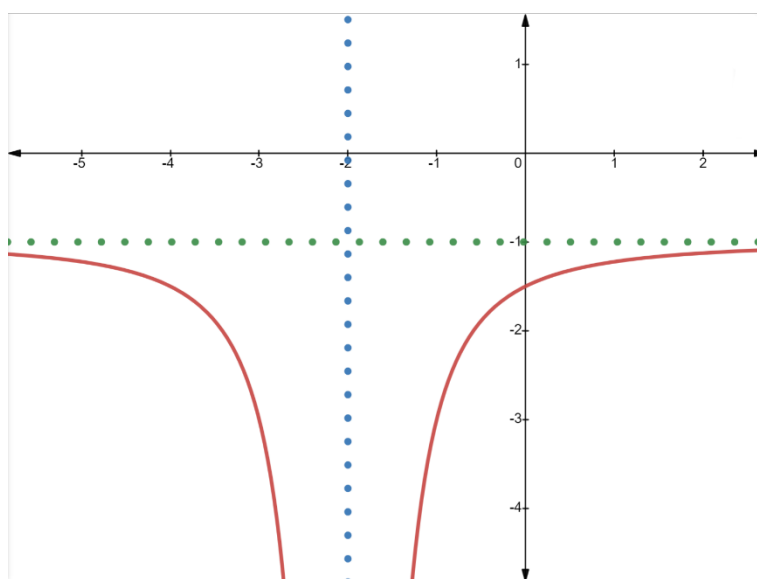
Question 5

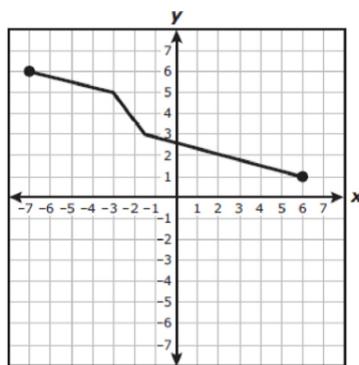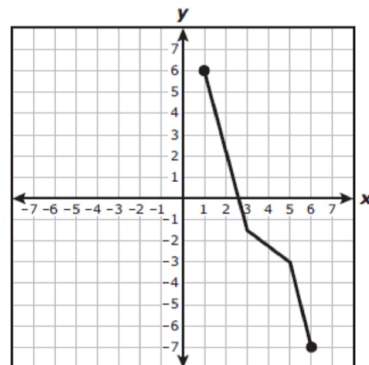The graph of the function f is shown. Which grid shows the graph of f^{-1}?

A

B

C

D

E

SECTION 2

Question 1

2 marks

Let $f:(-\infty,-2) \to R, f(x) = \dfrac{1}{(x+2)^2} - 1$. Write f^{-1} in mapping notation.

Question 2

3 marks

State the domain and range in exact form for the semi circle $y = \sqrt{5-2x-x^2} + 1$.
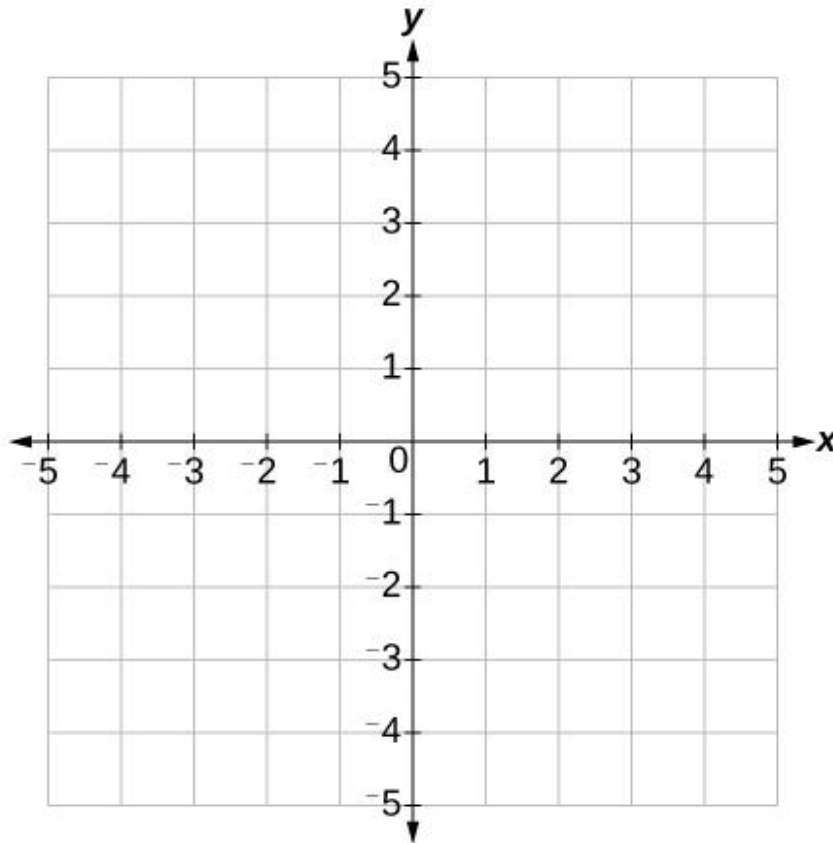
Question 3

a. Sketch the graph of the following function and state its range: 4 marks

$$f(x) = \begin{cases} (x+2)^2 - 1, & x < -2 \\ \sqrt{4-x^2}, & -2 \le x \le 2 \\ 3, & x > 2 \end{cases}$$

b. For what values of x is the function discontinuous? 1 mark