

MATH2 (814012) – SPRING 2006

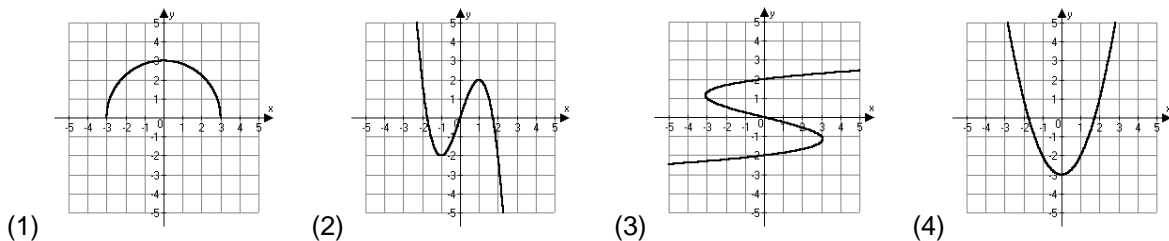
HOMEWORK OF UNIT2

FUNCTIONS

Question (1): Determine whether the following relations are functions or not (Give the reason)

1. $\{(-2, 10), (-3, -1), (4, -8)\}$
2. $|-10x| = |9y|$
3. $y^2 - 2x = 4$
4. $y^3 = 2x$
5. $y = -x^2$

Question (2): Use the vertical line test to determine which the following graphs is a graph of a function.



Question (3): State the domain and range of the following relations

- | | | |
|------------------------------|---------------------|-----------------------|
| 1. $\{(2, -10), (-6, -10)\}$ | 6. $f(x) = 8$ | 10. $f(x) = \sqrt{x}$ |
| 2. $\{(2, 1), (3, 2)\}$ | 7. $f(x) = (x-3)^2$ | 11. $f(x) = x-1 $ |
| 3. $y = \sqrt{x+3}$ | 8. $f(x) = -x^2$ | 12. $f(x) = x + 2$ |
| 4. $y = 5 - x$ | 9. $f(x) = x^2 - 2$ | |
| 5. $f(x) = 2x - 4$ | | |

Question (4): Let $f(x) = x^2 - 2x + 3$, $g(x) = -2x + 2$ and $k(x) = |x-3|$. Evaluate (Show your work)

- | | | |
|-------------------------|---------------------------------|------------------------------|
| 1. $\frac{g(0)}{k(-4)}$ | 2. $\frac{2f(-1) + g(1)}{k(3)}$ | 3. $\frac{g(h+2) - g(h)}{h}$ |
|-------------------------|---------------------------------|------------------------------|

Question (5): Find the domain of each of the following functions.

- | | | |
|--------------------------------------|------------------------------------|-------------------------|
| 1. $f(x) = \frac{-3}{x^2 - 25}$ | 3. $f(x) = \frac{-3}{x^2 + 25}$ | 5. $f(x) = \sqrt{2x+6}$ |
| 2. $f(x) = \frac{x+3}{x^2 + 3x - 4}$ | 4. $f(x) = \frac{3}{x^2 - x - 12}$ | 6. $f(x) = \sqrt{6-x}$ |

Question (6): Let $f(x) = 7$. Find the domain, the range, and graph $f(x)$.

Question (7): Let $f(x) = 3x - 2$. Find the domain, the range, the x - and y -intercepts, the slope and the intervals of increasing and decreasing.

Question (8): Let $g(x) = \sqrt{4x - 8}$. Find the domain, the range and graph $g(x)$.

Question (9): Let $f(x) = |2x - 3|$. Find the domain, the range and write $f(x)$ as a piecewise defined function.

Question (10): Let $f(x) = x^2 - 6x + 5$. Find the vertex, x - and y -intercepts, the maximum or minimum, the intervals of increasing and decreasing, the domain, the range and graph $f(x)$.

Question (11): Given the function $f(x) = -x^2 + 9$. Find the vertex and the x - and y -intercepts. Sketch the function, labeling at least three extra points on the graph of f .

Question (12): Find the domain, the range and graph each of the following functions:

1. $f(x) = \begin{cases} 2x - 1 & \text{if } x > 3 \\ 1 - x^2 & \text{if } x \leq 3 \end{cases}$

2. $g(x) = \begin{cases} 3x + 2 & \text{if } 1 \leq x < 2 \\ 3 - x & \text{if } 2 \leq x < 4 \end{cases}$

Question (13): Indicate how the graph of each function is related to the graph of its elementary function, and then sketch both graphs.

1. $y = -|x - 2|$

5. $y = (x + 1)^2 + 3$

2. $y = -|x - 2| + 3$

6. $y = 4 - \sqrt{x}$

3. $y = \sqrt{x - 2}$

7. $y = x + 3$

4. $y = \sqrt{x} - 2$

8. $y = -x - 1$

Question (14): The graph of the g , in each case, is formed by applying the indicated transformations to f . Find an equation for the function g and graph it.

1. The graph of $f(x) = \sqrt{x}$ is shifted 3 units to the right and 2 units down.

2. The graph of $f(x) = |x|$ is reflected in the x -axis and shifted 2 units to the left.

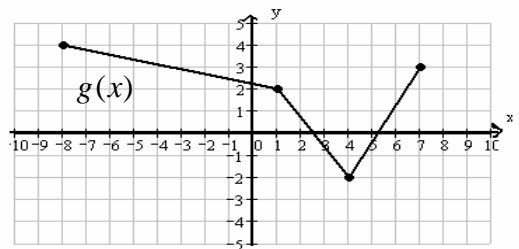
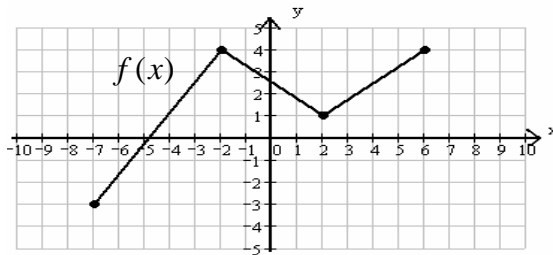
3. The graph of $f(x) = x^2$ is shifted 3 units to the left and reflected in the x -axis then shifted 2 units up.

Question (15): Let $f(x) = \sqrt{x+4}$ and $g(x) = x^2$

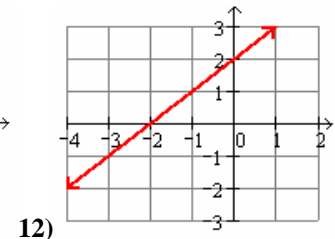
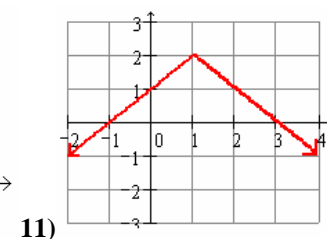
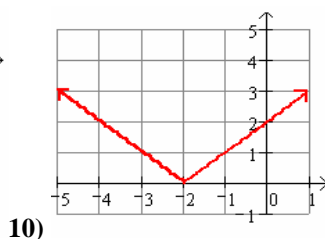
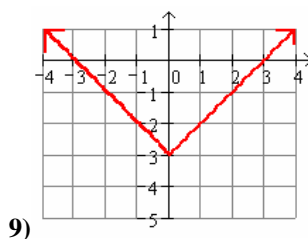
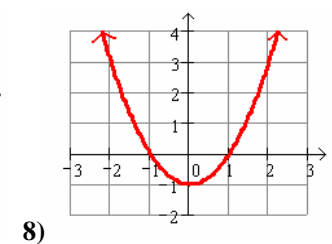
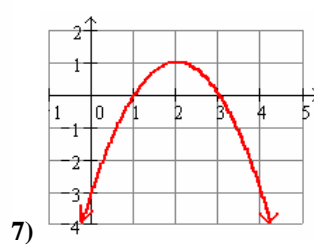
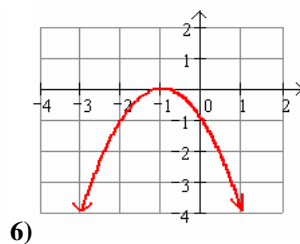
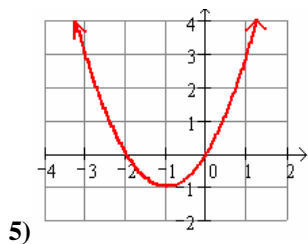
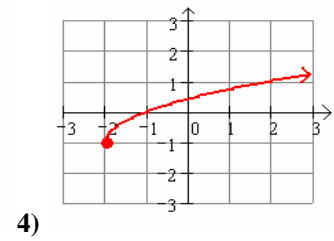
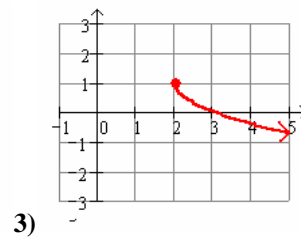
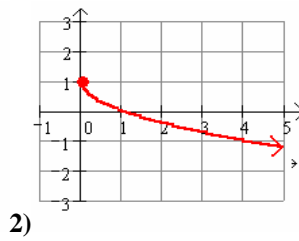
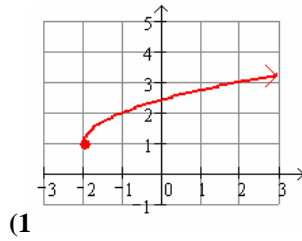
- Find $(f \circ g)(x)$ and the values $g(f(11))$ and $f(g(-5))$
- Find $(f + g)(x)$, $(f - g)(x)$, $(f \cdot g)(x)$, $\left(\frac{f}{g}\right)(x)$ and their domains

Question (16): Given the graphs of $f(x)$ and $g(x)$, answer the following:

- What is $f(g(4))$?
- What is $g(f(2))$?
- Graph $h(x) = f(x-1)$
- Graph $c(x) = g(x) - 2$



Question (17): Give, in each case, an equation for the function f in the following graphs (start from basic function in each case).

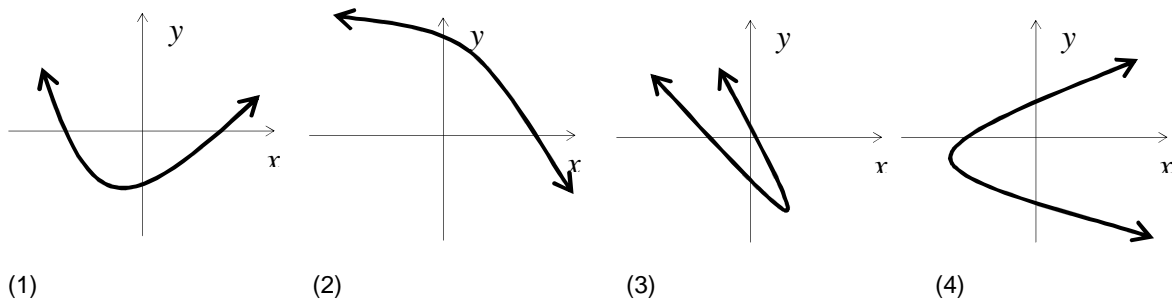


Question (18): Let $f(x) = -\sqrt{x+5}$, find the inverse function. What is the range of $f(x)$? What is the domain of $f^{-1}(x)$?

Question (19): Find the inverse function

1. $f(x) = -2x + 7$
2. $f(x) = \sqrt{3x+5}$
3. $f(x) = \frac{2x-1}{3x+4}$

Question (20): Which of the following graphs are graphs of functions? Which ones have inverse functions?



Question (21): Consider the graph of $y = f(x)$ below on the left. Which of the other three graphs is the graph of $y = -f(x)$? And which is $f^{-1}(x)$?

