

Math 30, Homework 1 on sections 1.2, 1.3

Write all your working out and answers on your own notepaper - no need to write the questions. Please use lots of space.

It is very important that you show clearly any work you had to do to get your answers. Just writing the answer down with no work shown is usually not enough. All 15 questions are worth 2 points each. Hand in your solutions next week only.

Do these first 10 questions and *check that your answers match the solutions on page 4*. If you don't get the same answers then look at your notes or the book or ask me. Only do the last five questions when you are sure you understand the first ten.

(1) Find the domain and range of this relation and say if it is a function:

$$\{(0, 3), (3, 2), (4, 2), (2, 0)\}.$$

(2) Does the equation $x^2 + y^2 = 4$ define y as a function of x ?

(3) For the function $f(x) = x^2 + 3x - 2$, find

(a) $f(0)$

(b) $f(4)$

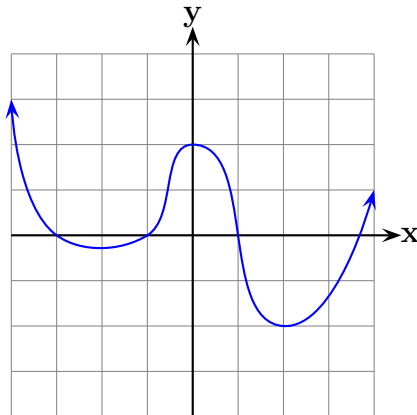
(c) $f(-3)$

(4) For the function $g(x) = 3x^2 + 8x$, compute and simplify

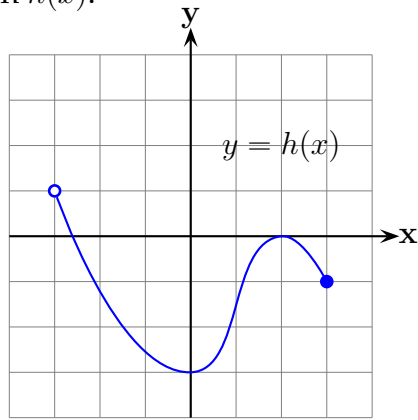
(a) $g(-x)$

(b) $g(x + 2)$

(5) Is this the graph of a function?



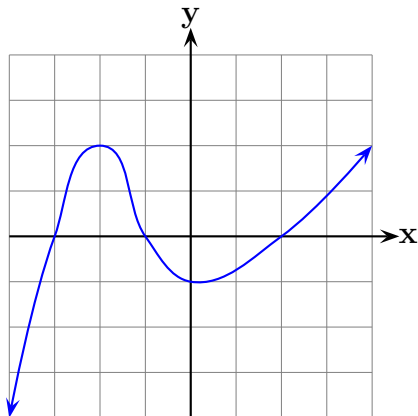
(6) This is the graph of the function $h(x)$.



Find the following:

- (a) $h(2)$
- (b) the domain of h
- (c) the range of h

(7) For this graph of a function,



find

- (a) all its x -intercepts,
- (b) its y -intercept.

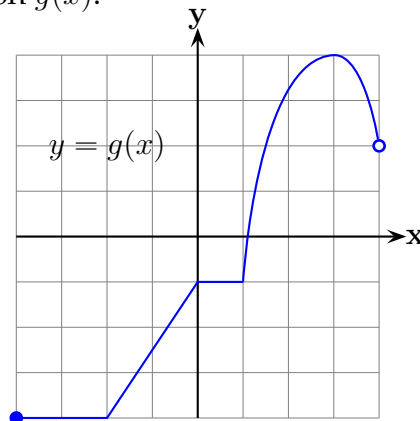
(8) For the graph in question 6, find

- (a) all intervals where it is increasing,
- (b) all intervals where it is decreasing,
- (c) all intervals where it is constant,
- (d) any x values where the function has a relative minimum,
- (e) any x values where the function has a relative maximum.

- (9) For the graph in question 7, find
- (a) all intervals where it is increasing,
 - (b) all intervals where it is decreasing,
 - (c) all intervals where it is constant,
 - (d) any x values where the function has a relative minimum,
 - (e) any x values where the function has a relative maximum.
- (10) For the graphs of the following two equations, decide if they have symmetry with respect to the x -axis, the y -axis or both or neither.
- (a) $y^2 = 3x - 1$
 - (b) $x^2 + y^2 = 9$

Five more questions. Show clearly all your working out and reasoning.

- (11) For the function $f(x) = \sqrt{2x - 8}$, find
- (a) $f(12)$
 - (b) $f(4)$
 - (c) $f(5)$
- (12) For the function $h(x) = x^3 - x + 1$, compute and simplify
- (a) $h(-x)$
 - (b) $h(x - 2)$
- (13) This is the graph of the function $g(x)$.



Find the following:

- (a) $g(-2)$
- (b) the domain of g
- (c) the range of g

- (14) For the graph in question 13, find
- (a) all intervals where it is increasing,
 - (b) all intervals where it is decreasing,
 - (c) all intervals where it is constant,
 - (d) any x values where the function has a relative minimum,
 - (e) any x values where the function has a relative maximum.
- (15) For the graphs of the following two equations, decide if they have symmetry with respect to the x -axis, the y -axis or both or neither.
- (a) $y = \frac{x^2 + 1}{x^2}$
 - (b) $y = 3x + 1$

Answers to questions (1)-(10):

- (1) The domain is $\{0, 2, 3, 4\}$, the range is $\{0, 2, 3\}$ and it is a function.
- (2) No (say why not).
- (3) (a) $f(0) = -2$, (b) $f(4) = 26$, (c) $f(-3) = -2$.
- (4) (a) $g(-x) = 3x^2 - 8x$, (b) $g(x + 2) = 3x^2 + 20x + 28$.
- (5) Yes (say why).
- (6) (a) $h(2) = 0$, (b) domain of h is $(-3, 3]$, (c) range of h is $[-3, 1)$.
- (7) (a) x -intercepts are $(-3, 0), (-1, 0), (2, 0)$, (b) y -intercept is $(0, -1)$.
- (8) (a) increasing on $(0, 2)$, (b) decreasing on $(-3, 0) \cup (2, 3)$,
(c) never constant, (d) relative min at $x = 0$, (e) relative max at $x = 2$.
- (9) (a) increasing on $(-\infty, -2) \cup (0, \infty)$, (b) decreasing on $(-2, 0)$,
(c) never constant, (d) relative min at $x = 0$, (e) relative max at $x = -2$.
- (10) (a) just symmetric with respect to x -axis, (b) symmetric with respect to both the x -axis and the y -axis.