TEST: FUNCTIONS

NAME

QUESTION 1. a) Given that $f(x) = x^2 - x$, find

(i) $f(-3)$

(ii) x when $f(x) = 6$

(b) If $f(x) = ax^2 + bx + c$ find the value of $f(x) - f(-x)$.

Question 2.

(a) State:

(i) the natural (largest possible) domain; and

(ii) the range of the function f for which $f(x) = \sqrt{(1 - x^2)}$.

(b) Sketch the graph of the function in (a) (not on graph paper).

Question 3. Draw sketches (not accurately drawn graphs) of the following curves, showing essential features:

State the domain and range of each.

(a) $y = x^2 - 4$

(b) $x^2 + y^2 = 9$

(c) $y = \frac{-4}{x}$

(d) $y = |x| + 1$

(e) $y = (x + 2)^3$

f) $y = \sqrt{25 - x^2}$

Which, if any, are odd or even functions.

QUESTION 4. *A function is defined by the following rule:*

$f(t) = 3t + 2$ *for* $t \geqslant 0$

$= t^2 + 2$ *for* $t < 0$

(a) *Draw a neat sketch of the function for* $-2 \leqslant t \leqslant 2$

(b) *Evaluate* $f(-2) + f(0) + 3f(1)$

(c) Is the function f continuous at $t = 0$?

Question 5. Sketch the curve $y = \left| \frac{2}{x} \right|$

Is the function even, odd or neither?

Give a full explanation for your answer:

QUESTION 6. On a number plane diagram, shade the region for which the following inequalities are satisfied simultaneously

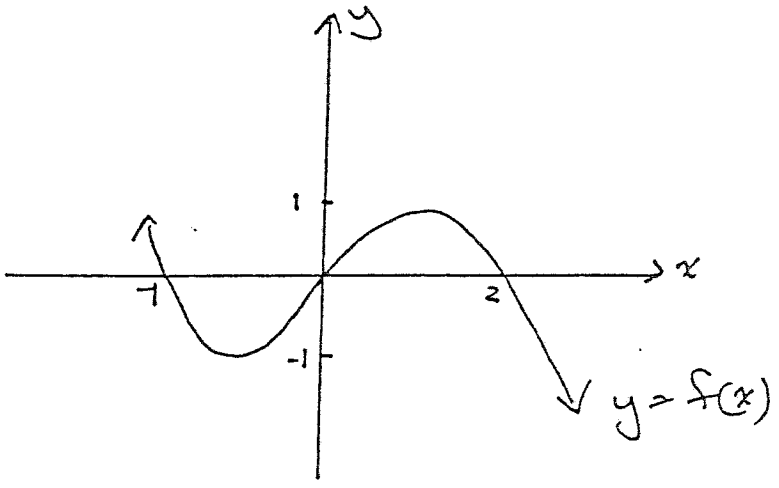
$$x + y > 2$$

$$y \leq 4$$

$$y \geq x^2$$

Question 7

Drawn below is the graph of $y = f(x)$



Draw a neat sketch of:

a) $y = -f(x)$

b) $y = |f(x)|$

c) $y = f(x) + 1$

d) $y = f(x+1)$

QUESTION 1

a) $f(-3) = 9 - -3$
$= 12$

ii) $x^2 - x = 6$
$x^2 - x - 6 = 0$
$(x-3)(x+2) = 0$
$x = 3$ or $x = -2$

b) $f(x) - f(-x)$
$= ax^2 + bx + c - [ax^2 - bx + c]$
$= 2bx$

QUESTION 2

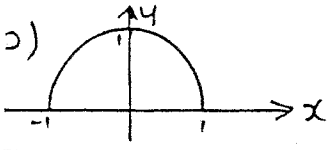
a i) $1 - x^2 \geq 0$
$(1-x)(1+x) \geq 0$

$-1 \leq x \leq 1$

for x in $= \{x : -1 \leq x \leq 1, x \in R\}$

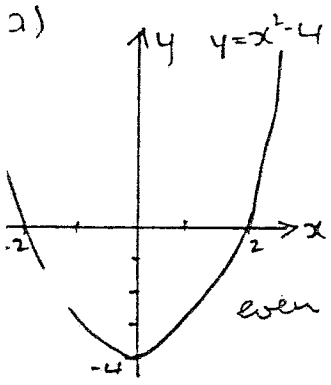
ii) range $= \{y : 0 \leq y \leq 1, y \in R\}$

b)



QUESTION 3

a)

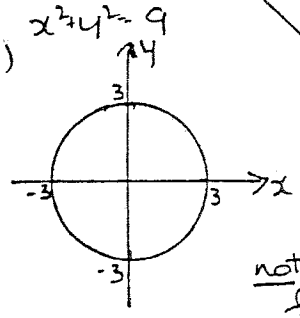


even fn

$D = x \in R$

$R = \{y : y \geq -4, y \in R\}$

b)

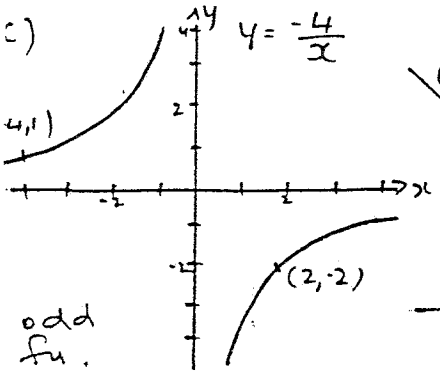


not a function

$D = \{x : -3 \leq x \leq 3, x \in R\}$

$R = \{y : -3 \leq y \leq 3, y \in R\}$

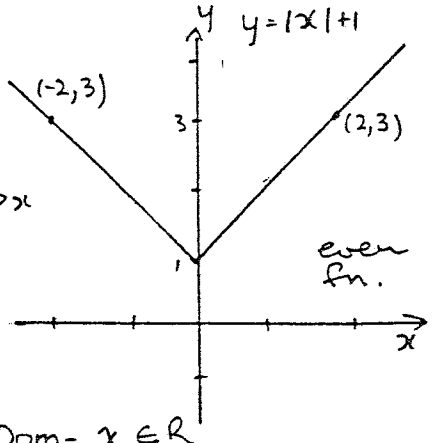
c)



odd fn.

Dom $= x \in R, x \neq 0$

Range $= y \in R, y \neq 0$

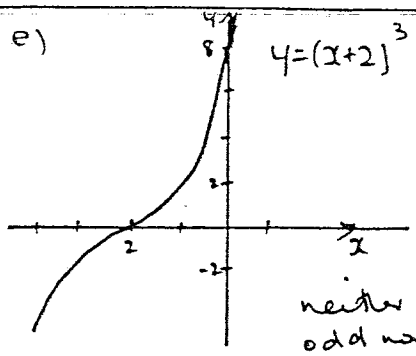


even fn.

Dom $= x \in R$

Range $= \{y : y \geq 1, y \in R\}$

e)



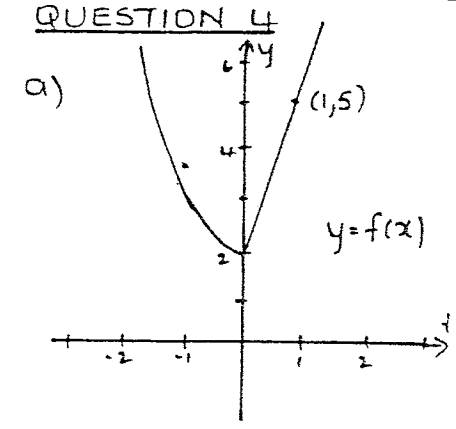
neither odd nor even.

Domain $= x \in R$

Range $= x \in R$

QUESTION 4

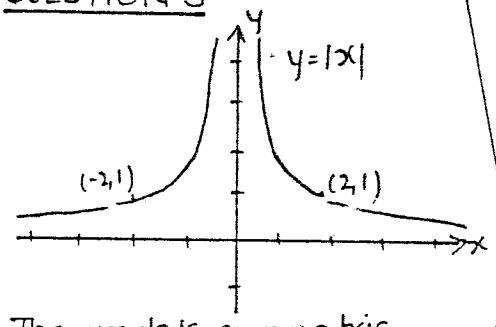
a)



b) $f(-2) + f(0) + 3f(1)$
$= 6 + 2 + 3.5$
$= 23$

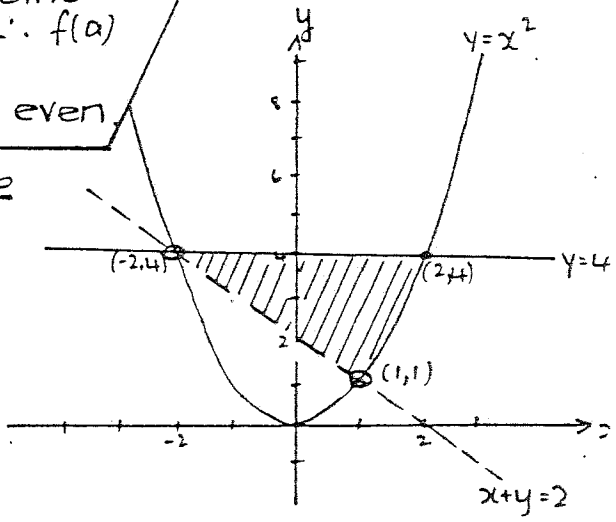
c) Yes, $f(t)$ cts at $t = 0$

QUESTION 5



The graph is symmetric about the y-axis, $\therefore f(a) = f(-a)$ for all a
$\therefore$ the function is even.

QUESTION 6

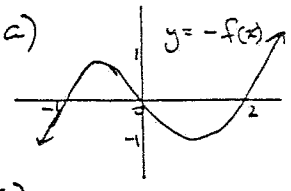


Test (0,0) in $x + y > 2$
Is $0 + 0 > 2$? No

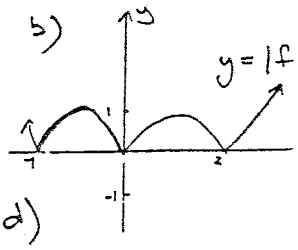
Test (0,1) in $y \geq x^2$
Is $1 \geq 0^2$? Yes

QUESTION 7

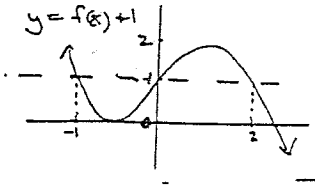
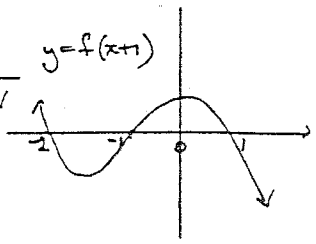
a)



b)



c)



d)