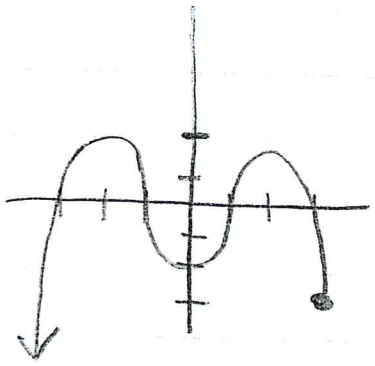
Notes Section 1.2 - analyzing graphs of functions and relations

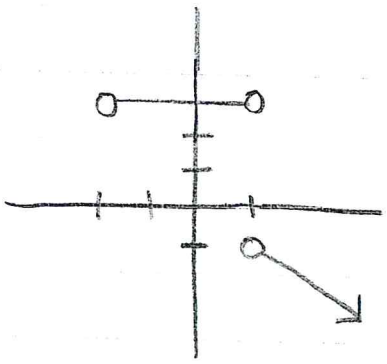
- find the domain and range

1.



D: $(-\infty, 3]$
R: $(-\infty, 2]$

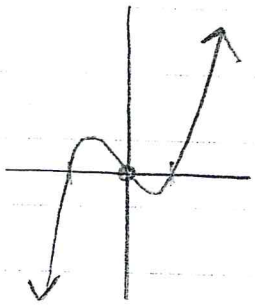
2.



D: $(-2, 1)(1, \infty)$
R: $(-\infty, -1)[3]$

- find the zeros and the y-intercepts

1. $f(x) = x^3 - x$



Zeros ($y = 0$)

$0 = x^3 - x$

$0 = x(x^2 - 1)$

$0 = x(x+1)(x-1)$

$x = 0 \quad x = -1 \quad x = 1$

y-intercepts ($x = 0$)

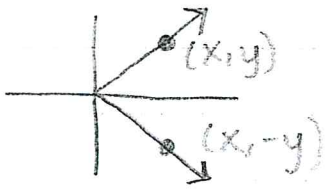
$y = 0^3 - 0$

$y = 0$

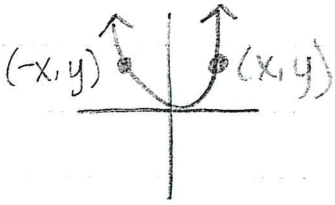
$(0, 0)$

tests for symmetry

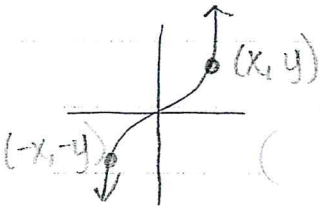
x-axis — replace y with -y



y-axis — replace x with -x

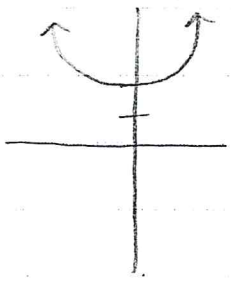


origin — replace x with -x and y with -y



• determine the symmetry, confirm algebraically

1. $y = x^2 + 2$



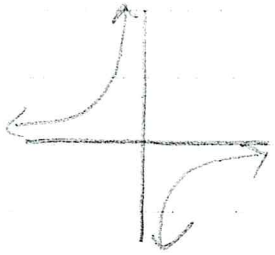
y-axis

(replace x with -x)

$y = (-x)^2 + 2$

$y = x^2 + 2$ ✓

2. $xy = -6$



origin

(replace $x \to -x$, $y \to -y$)

$(-x)(-y) = -6$

$xy = -6$ ✓

even | odd functions

even functions are symmetric to y-axis
$f(x) = f(-x)$

odd functions are symmetric to origin
$f(-x) = -f(x)$

- determine if even | odd | neither

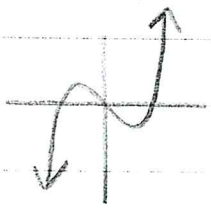
1. $f(x) = x^3 - 2x$

$f(-x) = (-x)^3 - 2(-x)$
$= -x^3 + 2x$

$-f(x) = -(x^3 - 2x)$
$= -x^3 + 2x$

$\neq$ $=$

odd
origin

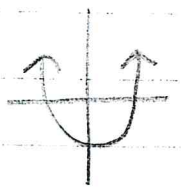


2. $f(x) = x^2 - 4$

$f(-x) = (-x)^2 - 4$
$= x^2 - 4$

$=$

even
y-axis

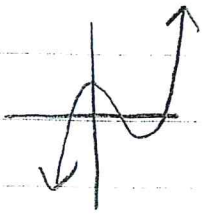


3. $f(x) = x^3 - 3x^2 - x + 3$

$f(-x) = (-x)^3 - 3(-x)^2 - (-x) + 3$
$= -x^3 - 3x^2 + x + 3$

$-f(x) = -(x^3 - 3x^2 - x + 3)$
$= -x^3 + 3x^2 + x - 3$

$\neq$ $\neq$



neither
no symmetry