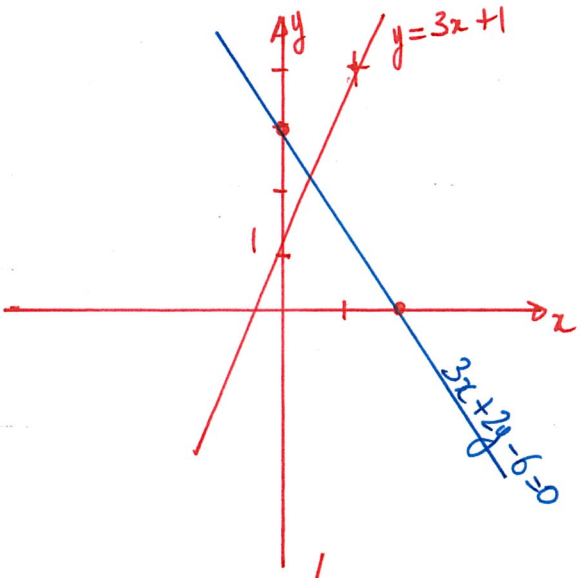
SKETCHING BASIC FUNCTIONS

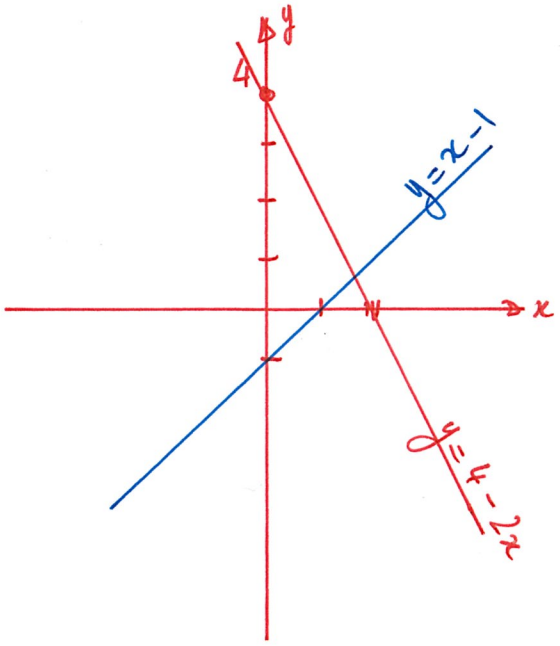
1 Sketch each function. State the gradient and the x- and y-intercepts for each.

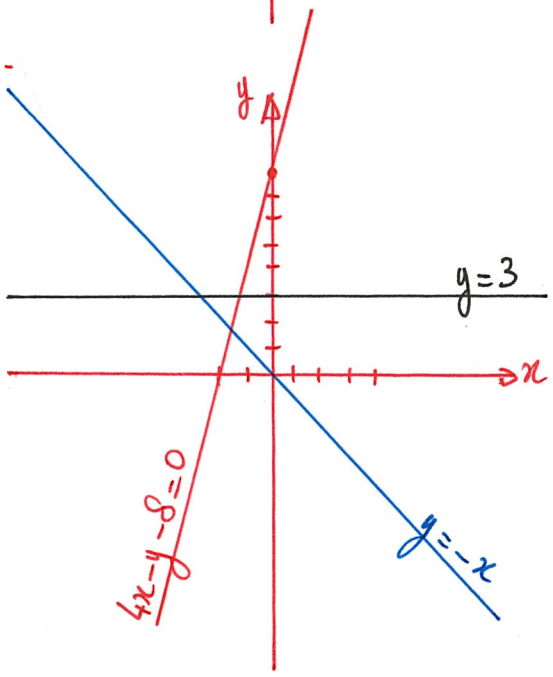
(a) $y = 3x + 1$ (b) $3x + 2y - 6 = 0$ (c) $y = 4 - 2x$ (d) $y = x - 1$ (e) $4x - y - 8 = 0$

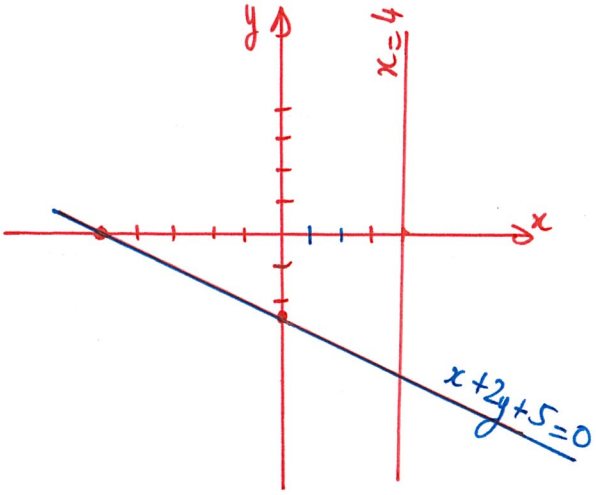
(f) $y = -x$ (g) $y = 3$ (h) $x = 4$ (i) $x + 2y + 5 = 0$

$y = 4x + 8$









2 For each part of question 1, determine whether the function is increasing, decreasing or neither. What do you notice about the gradient in each case?

a) increasing b) decreasing c) decreasing d) increasing

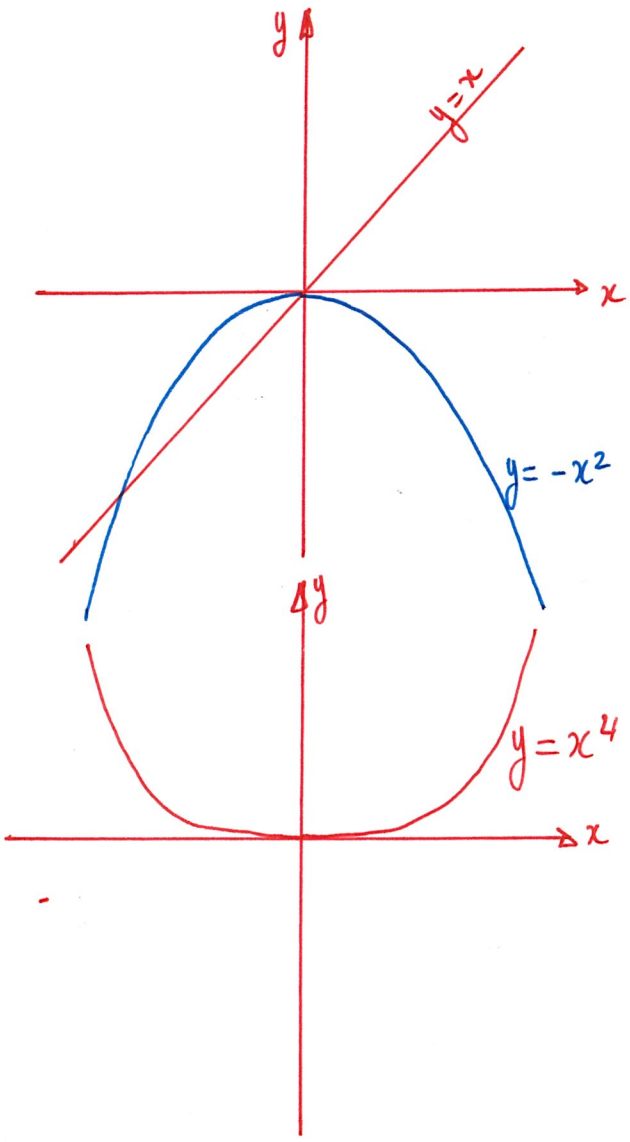
e) increasing f) decreasing g) neither h) neither

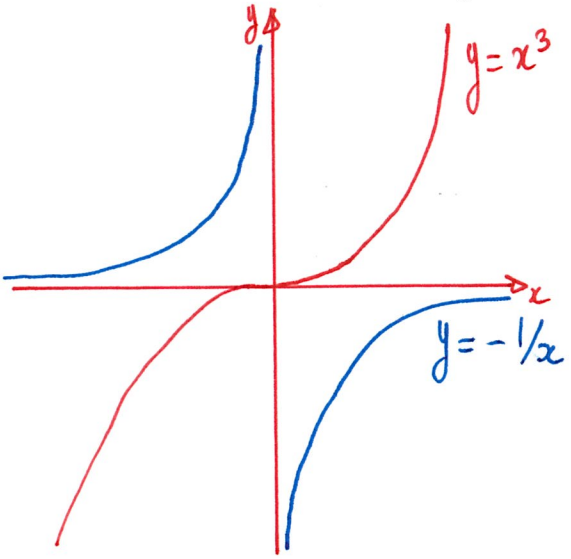
i) decreasing.

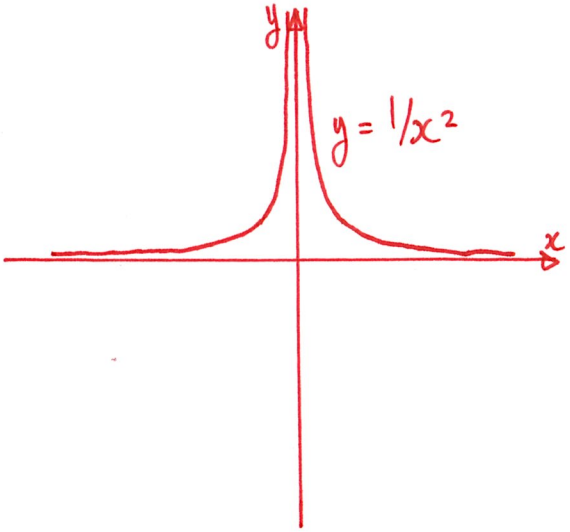
SKETCHING BASIC FUNCTIONS

3 Sketch each function, showing any intercepts on the coordinate axes. State the domain for which each function is increasing.

(a) $f(x)=x$ (b) $f(x)=-x^2$ (c) $f(x)=x^3$ (d) $f(x)=-\frac{1}{x}$ (e) $f(x)=x^4$ (f) $f(x)=\frac{1}{x^2}$







4 For each part of question 3, determine whether the function is odd, even or neither.

a) odd b) even c) odd d) odd

e) even f) even

SKETCHING BASIC FUNCTIONS

5 If $f(x) = 2x^2$ and $g(x) = \frac{3}{x}$, which of the following statements is correct?

A f and g are both odd functions
B f is an even function and g is an odd function
C f and g are both even functions
D f and g are neither even nor odd functions

6 For $y = 2x - 3$, indicate whether each statement is correct or incorrect.

(a) gradient = 2 (b) x-intercept = 3 (c) y is an increasing function (d) y-intercept = 3

correct correct

Show that $g(x) = x^8 + 3x^4 - 2x^2$ is an even function.

$g(-x) = (-x)^8 + 3(-x)^4 - 2(-x)^2$

$g(-x) = x^8 + 3x^4 - 2x^2$

$\therefore g(-x) = g(x)$ so g is an even function.

Show that $h(x) = -x^3 + 4x$ is an odd function.

$h(-x) = -(-x)^3 + 4(-x)$

$h(-x) = x^3 - 4x$

$\therefore h(-x) = -h(x)$

so h is an odd function.

SKETCHING BASIC FUNCTIONS

Are these functions even, odd or neither?

a) $f(x) = \frac{x^3}{x^4 - x^2}$

b) $g(x) = \frac{1}{x^3 - 1}$

c) $h(x) = \frac{3}{x^2 - 4}$

d) $f(x) = \frac{x-3}{x+3}$

e) $h(x) = \frac{x^3}{x^5 - x^2}$

a) $f(-x) = \frac{(-x)^3}{(-x)^4 - (-x)^2} = \frac{-x^3}{x^4 - x^2}$

$\therefore f(-x) = -f(x)$ so f is odd.

b) $g(-x) = \frac{1}{(-x)^3 - 1} = \frac{1}{-x^3 - 1}$ which is different of $-g(x)$ or of $g(x)$.

So g is neither odd or even.

c) $h(-x) = \frac{3}{(-x)^2 - 4} = \frac{3}{x^2 - 4} = h(x)$

so h is an even function.

d) $f(-x) = \frac{(-x)-3}{(-x)+3} = \frac{-x-3}{-x+3}$

which is different of both $f(x)$ or $-f(x)$.

So f is neither odd or even

e) $h(-x) = \frac{(-x)^3}{(-x)^5 - (-x)^2} = \frac{-x^3}{-x^5 - x^2}$

which is different of both $h(x)$ or $-h(-x)$

So h is neither an odd or even function

SKETCHING BASIC FUNCTIONS

HSC questions

2. Functions, 2ADV F1 2013 HSC 3 MC

Which inequality defines the domain of the function $f(x) = \dfrac{1}{\sqrt{x+3}}$?

(A) $x > -3$
(B) $x \geq -3$
(C) $x < -3$
(D) $x \leq -3$

3. Functions, 2ADV F1 2020 HSC 1 MC

Which inequality gives the domain of $y = \sqrt{2x-3}$?

A. $x < \dfrac{3}{2}$
B. $x > \dfrac{3}{2}$
C. $x \leq \dfrac{3}{2}$
D. $x \geq \dfrac{3}{2}$

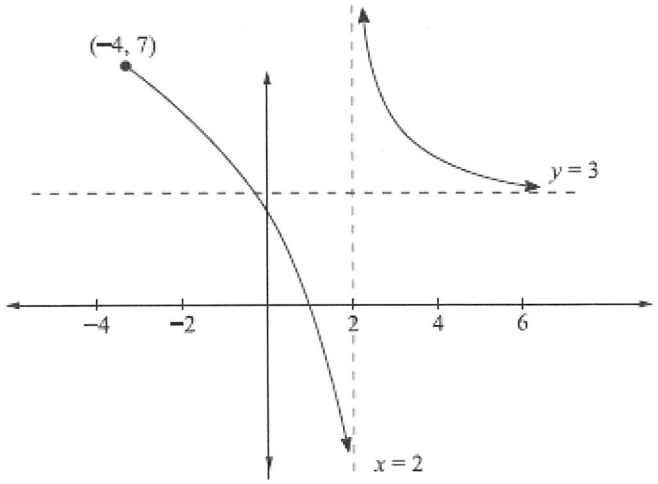
$2x - 3 \geqslant 0$

$2x \geqslant 3$

$x \geqslant \dfrac{3}{2}$

21. Functions, 2ADV F1 EQ-Bank 6

The graph of $f(x)$ is shown below. It has asymptotes at $y = 3$ and $x = 2$.



Domain is $[-4, 2) \cup (2, +\infty)$

Range is $(-\infty, +\infty)$

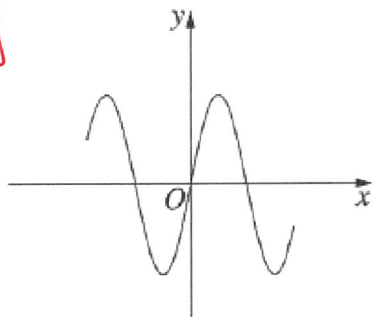
Using interval notation, state the domain and range of $f(x)$. *(2 marks)*

SKETCHING BASIC FUNCTIONS

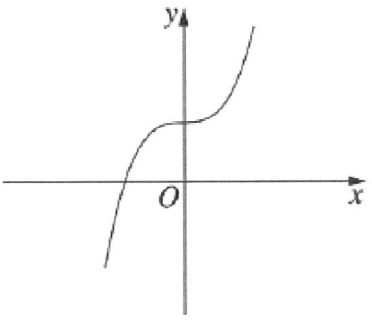
4. Functions, 2ADV F1 2016 HSC 4 MC

Which diagram shows the graph of an odd function?

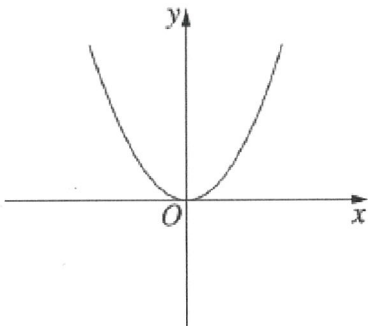
(A)



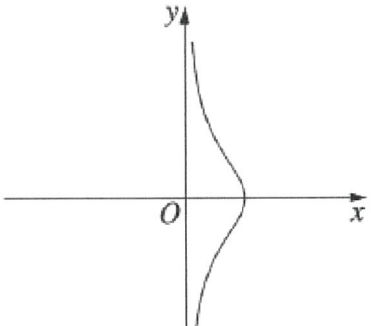
(B)



(C)



(D)



1. Functions, 2ADV F1 SM-Bank 2 MC

Let $f(x)$ and $g(x)$ be functions such that $f(2) = 5$, $f(3) = 4$, $g(2) = 5$, $g(3) = 2$ and $g(4) = 1$.

The value of $f(g(3))$ is

$f(g(3)) = f(2) = 5$

A. 1

B. 2

C. 4

D. 5

4. Functions, 2ADV F1 SM-Bank 13 MC

Which one of the following functions satisfies the functional equation $f(f(x)) = x$?

A. $f(x) = 2 - x$ → $f(f(x)) = f(2-x) = 2-(2-x) = x$ so A

B. $f(x) = x^2$ → $f(f(x)) = f(x^2) = (x^2)^2 = x^4 \neq x$

C. $f(x) = 2\sqrt{x}$ → $f(f(x)) = f(2\sqrt{x}) = 2\sqrt{2\sqrt{x}} \neq x$

D. $f(x) = x - 2$ → $f(f(x)) = f(x-2) = (x-2)-2 = x-4 \neq x$

29. Functions, 2ADV F1 2017 HSC 11h

Find the domain of the function $f(x) = \sqrt{3-x}$. (2 marks)

$3 - x \geqslant 0$ so $-x \geqslant -3$

$x \leqslant 3$

Domain is $(-\infty, 3]$