# COURSE REVIEW

Transformations:

1) State the transformation(s) that each function has undergone. Then state the transformations in function and in mapping notation.

a) $y = -\frac{1}{4}\sqrt{3(x-7)}$, base function: $f(x) = \sqrt{x}$

V. compression by a factor of 4
reflection along the x-axis
H. compression by a factor of 3
H. translation to the right 7 units

$y = \frac{-1}{2}f(3(x-7))$

$(x, y) \to \left(\frac{1}{3}x+7, \ \frac{-1}{2}y\right)$

b) $y = 3(4-x)^3 - 6$, base function: $f(x) = x^3$

$y = 3(-x+4)^3 - 6$

$y = 3[-1(x-4)]^3 - 6$

V. stretch by a factor of 3
reflection along the y-axis
H. shift right 4 units
V. translation 6 units down

$y = 3f(-(x-4)) - 6$

$(x, y) \to (-x+4, \ 3y-6)$

c) $y = -3(4)^{x-1}$, compare to $f(x) = (4)^x$

reflection along the x-axis
V. stretch by a factor of 3
H. translation right 1 unit

fnct. notation: $y = -3f(x-1)$

mapping notation: $(x, y) \to (x+1, \ -3y)$

d) $y = \log(-x)$, compare to $f(x) = \log(x)$

reflection along the y-axis

fnct. notation: $y = f(-x)$

mapping notation: $(x, y) \to (-x, y)$

e) $y=-2\cos\frac{1}{3}\left(\theta-\frac{\pi}{2}\right)+1$, compare to $f(\theta)=\cos(\theta)$

reflection along the x-axis

V. stretch by a factor of 2

H. stretch by a factor of 3

V. shift up 1 unit

fnct. notation: $y=-2f\left(\frac{1}{3}\left(\theta-\frac{\pi}{2}\right)\right)+1$

mapping notation: $(x,y)\rightarrow\left(3x+\frac{\pi}{2},\ -2y+1\right)$

2) The graph of $f(x)=x^4$ is horizontally stretched by a factor of 2, reflected in the $y$-axis, and shifted up 5 units. Find the equation of the transformed function.

H. stretch by a factor of 2

reflected in the y-axis

shifted up 5 units

$y=\left(-\frac{1}{2}(x)\right)^4+5$

$y=\left(-\frac{1}{2}x\right)^4+5$

note this would be the same graph as

$y=\frac{1}{16}x^4+5$

Inverses:

3) Determine the inverse of each of the following. State if the invese is not a function and state any restrictions.

a) $y=x^2-10$

inverse: $x=y^2-10$

$x+10=y^2$

$\pm\sqrt{x+10}=y$

not a fnct.

$D_{inverse}:\{x\mid x\geq-10,\ x\in\mathbb{R}\}$

extra: for the inverse to be a fnct $D_{original}:\{x\mid x\geq0,\ x\in\mathbb{R}\}$ or $x\leq0$

b) $f(x)=2x+1$

f: $y=2x+1$

inverse: $x=2y+1$

$x-1=2y$

$\frac{1}{2}x-\frac{1}{2}=y$

$\frac{1}{2}x-\frac{1}{2}=f^{-1}(x)$

$D_{f^{-1}}:\{x\mid x\in\mathbb{R}\}$ $\therefore$ inverse is a fnct.

c) $y = \dfrac{1}{x+3} - 1$

inverse: $x = \dfrac{1}{y+3} - 1$

$x + 1 = \dfrac{1}{y+3}$

$y + 3 = \dfrac{1}{x+1}$

$y = \dfrac{1}{x+1} - 3$

$f^{-1}(x) = \dfrac{1}{x+1} - 3$

$D_{f^{-1}(x)}: \{x \mid x \neq -1, x \in \mathbb{R}\}$

d) $y = \log_2 x$

inverse: $x = \log_2 y$

$\Leftrightarrow \quad 2^x = y$

$2^x = f^{-1}(x)$

$D_{f^{-1}}: \{x \mid x \in \mathbb{R}\}$

e) $y = 10^{x-4} + 7$

inverse: $x = 10^{y-4} + 7$

$x - 7 = 10^{y-4}$

$\Leftrightarrow \quad y - 4 = \log_{10}(x-7)$

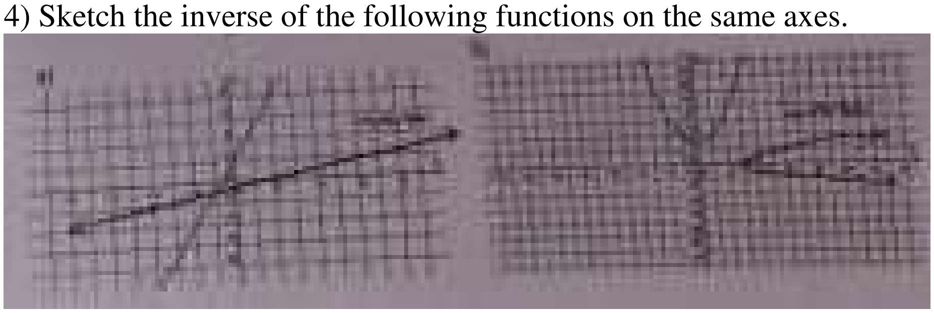
$y = \log_{10}(x-7) + 4$

$f^{-1}(x) = \log_{10}(x-7) + 4$

The inverse is a fnct!

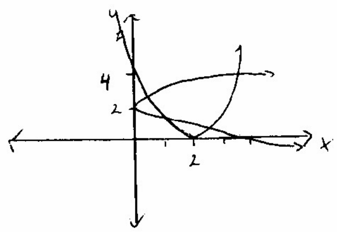
$D_{f^{-1}}: \{x \mid x > 7, x \in \mathbb{R}\}$

4) Sketch the inverse of the following functions on the same axes.



5) Sketch $f(x)=(x-2)^2$ and its inverse. What would the domain have to be so that the inverse is a function?

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



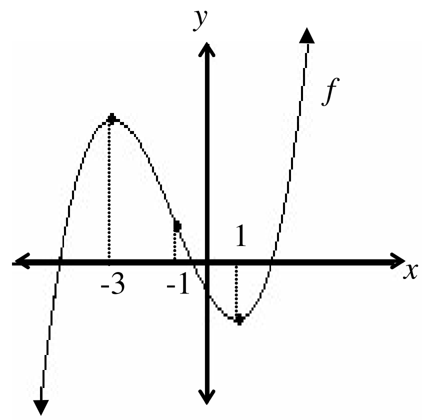

$D_f: \{x \mid x \geq 0, x \in \mathbb{R}\}$
so that inverse is a fnct.

$D_f: \{x \mid x \leq 0, x \in \mathbb{R}\}$
so that inverse is a fnct.

<u>Functions, properties and their graphs</u>:

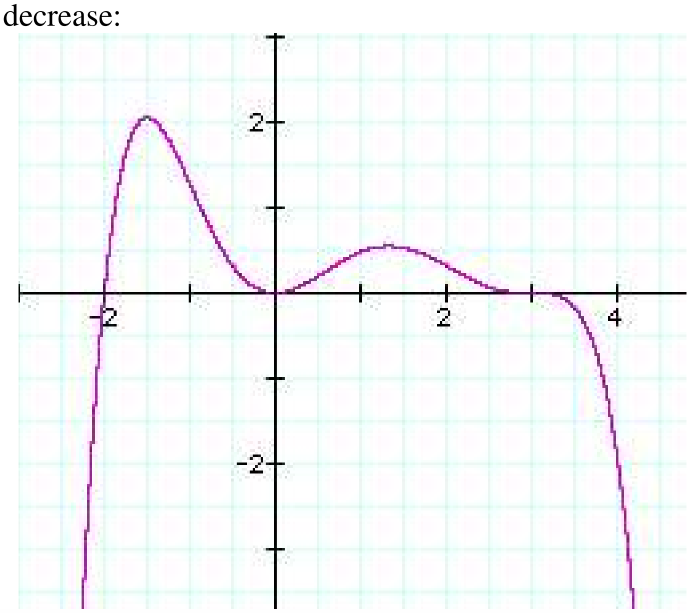
6) Given the graph of $y = f(x)$ shown on the right, state the intervals of $x$ for which
(a) the function is decreasing

(b) the function is concave up



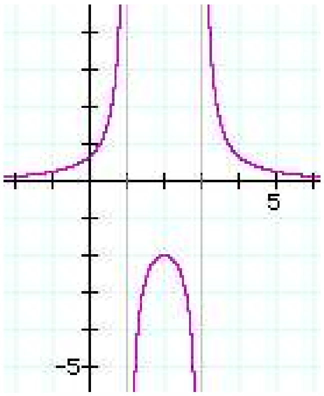

a) fnct is decr.: $-3 < x < 1$
b) fnct is conc. down: $x < -1$

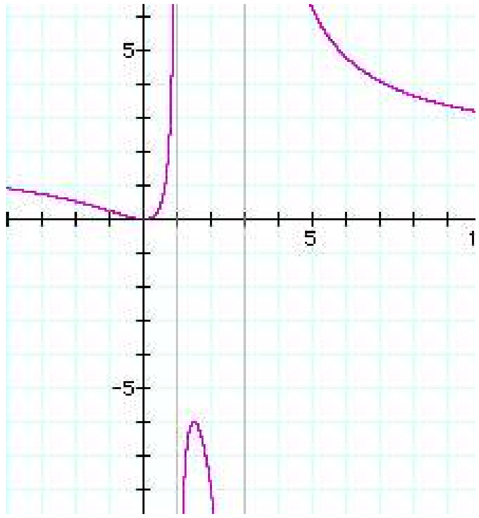
7) For the following graph, state the number of turning points, the number of inflection points, and the intervals of increase and decrease:

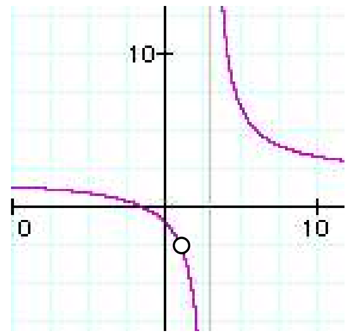



3 turning pts (2 max and one min.)
4 points of inflections
incr. $x < -1.5$ or $0 < x < 1.3$
decr. $-1.5 < x < 0$ or $1.3 < x < 3$ or $x > 3$

8) Which graph best matches the equation: $y = \dfrac{2x^2 + x - 3}{x^2 - 4x + 3}$?




8) $y = \dfrac{2x^2 + x - 3}{x^2 - 4x + 3}$

$p = -6$, $s = 1$   $3, -2$

$p = 3$, $s = -4$   $-3, -1$

factor to determine zeros, VA, holes, HA/OA

$$y = \frac{(2x+3)\cancel{(x-1)}}{(x-3)\cancel{(x-1)}}$$

$$y = \frac{2x+3}{x-3}; \quad x \neq 1$$

$\therefore$ hole at $x = 1$

let $x = 1$

$$y = \frac{2(1)+3}{1-3}$$

$$y = -\frac{5}{2}$$

$\therefore$ hole $\left(1, \frac{-5}{2}\right)$

VA: let $x - 3 = 0$

$x = 3$

zero: let $2x + 3 = 0$

$2x = -3$

$x = \frac{-3}{2}$

HA: equal degrees

$\therefore$ divide coeff.

$y = 2$

These properties match the $3^{rd}$ graph.

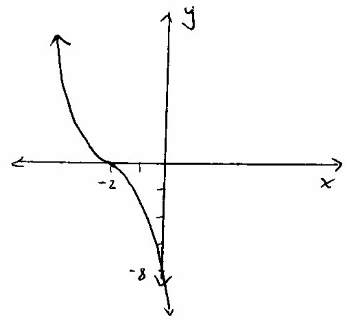
9) Sketch each of the following functions labelling: intercepts and asymptotes and stating the domain.

a) $y = -(x+2)^3$

→ special cubic, no asymptotes.
→ -ve lead coeff
∴ as $x \to \infty$, $y \to -\infty$
→ shifted left 2 units
→ zero $-2$, pt. of inflection

x-int (let $y=0$)
$0 = -(x+2)^3$
$0 = (x+2)^3$
$\sqrt[3]{0} = x+2$
$0 = x+2$
$-2 = x$

y-int. (let $x=0$)
$y = -(2)^3$
$y = -8$




D: $\{x \mid x \in \mathbb{R}\}$

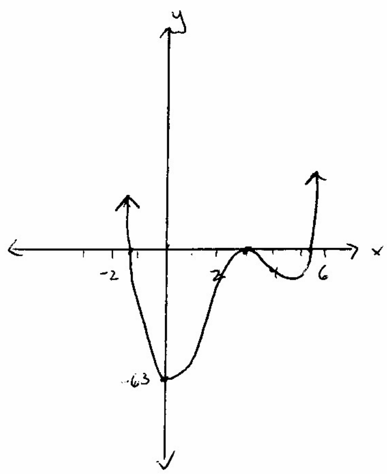
b) $y = (x-3)^2(x^2-4x-7)$

→ quartic, no asymptotes
→ +ve lead coeff
∴ as $x \to \infty$, $y \to \infty$
→ DR at $x=3$, turning pt.

x-int (let $y=0$)
$(x-3)^2 = 0$
$x = 3$

$x^2-4x-7=0$
$x = \frac{4 \pm \sqrt{16+28}}{2}$
$x \doteq 5.32$
$x \doteq -1.32$

y-int (let $x=0$)
$y = (-3)^2(-7)$
$y = -63$



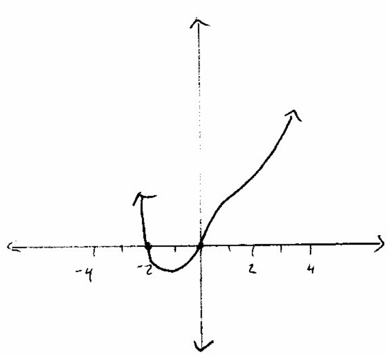

D: $\{x \mid x \in \mathbb{R}\}$

c) $y = x^4 + 2x^3 + x^2 + 2x$

→ quartic, no asymptotes
→ +ve lead coeff.
∴ as $x \to \infty$, $y \to \infty$

x-int. (let $y=0$)
$0 = x(x^3+2x^2+x+2)$
$0 = x[x^2(x+2)+1(x+2)]$
$0 = x(x+2)(x^2+1)$
$x=0$, $x=-2$ no real sol$^n$

y-int (let $x=0$)
$y=0$




D: $\{x \mid x \in \mathbb{R}\}$

d) $f(x)=\dfrac{x^2+3}{x+4}$

d) $f(x) = \dfrac{x^2+3}{x+4}$

→ rational fnct

→ deg numerator > deg denom. by 1 ∴ OA

→ +ve lead. coeff. ∴ ends in QI

x-int (let $y=0$)

$0 = \dfrac{x^2+3}{x+4}$

⇒ numerator $=0$

$x^2+3=0$

no real $sol^n$

∴ no x-int

y-int (let $x=0$)

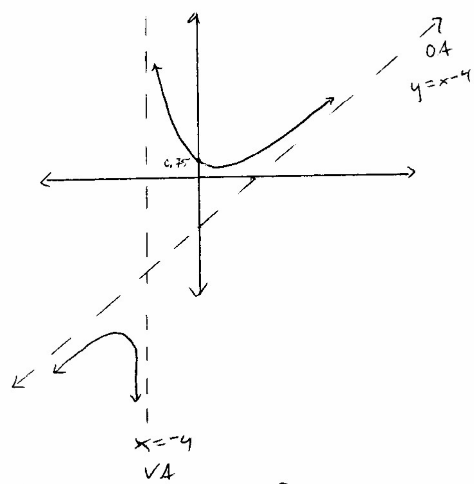
$y=\frac{3}{4}$

VA: $x=-4$

OA:

$$\begin{array}{r|rrr} -4 & 1 & 0 & 3 \\ & \downarrow & -4 & 16 \\ \hline & 1 & -4 & 19 \neq 0 \end{array}$$

O.A. $y=x-4$




D: $\{x \mid x \neq -4, x \in \mathbb{R}\}$

e) $f(x)=\log(x+2)$

9e) $f(x) = \log(x+2)$

→ logarithmic fnct, VA

→ shifted left 2 units

x-int (let $y=0$)

$0 = \log(x+2)$

⟺ $10^0 = x+2$

$1 = x+2$

$-1 = x$

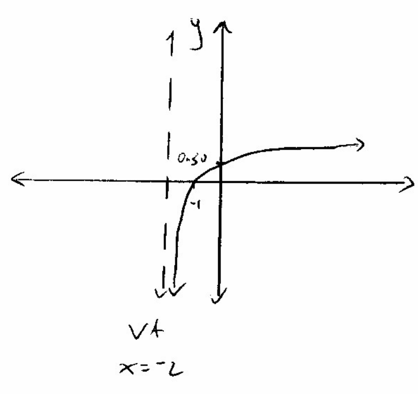
y-int (let $x=0$)

$y = \log 2$

$y \doteq 0.3010$

VA let $x+2=0$

$x=-2$




D: $\{x \mid x > -2, x \in \mathbb{R}\}$

f) $f(x)=3\cdot 5^{-x}+4$

→ exponential fnct, HA

→ v. stretch by a factor of 3

→ reflection along y-axis

→ v. shift up 4 units

x-int (let $y=0$)

$0 = 3\cdot 5^{-x}+4$

$-4 = 3\cdot 5^{-x}$

$-\frac{4}{3} = 5^{-x}$ (no sol$^{n}$)

$\Leftrightarrow \log_5 \frac{-4}{3} = -x$ ← check

$\frac{\log \frac{-4}{3}}{\log 5} = -x$

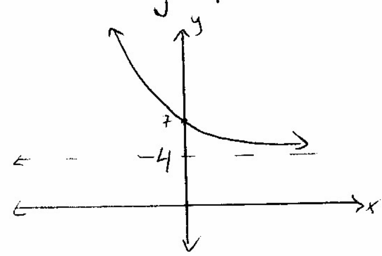
no sol$^{\underline{n}}$

y-int (let $x=0$)

$f(0) = 3\cdot 5^{0}+4$

$f(0) = 7$

HA $y=4$




D: $\{x \mid x \in \mathbb{R}\}$

g) $f(x)=\dfrac{10-10x}{(x-4)^2}$

→ rational fnct

→ deg numerator < deg of denom
∴ HA

→ −ve lead coeff
∴ ends in QIV

x-int

let $-10x+10=0$

$10 = 10x$

$1 = x$

y-int. let $x=0$

$f(0) = \frac{10}{(-4)^2}$

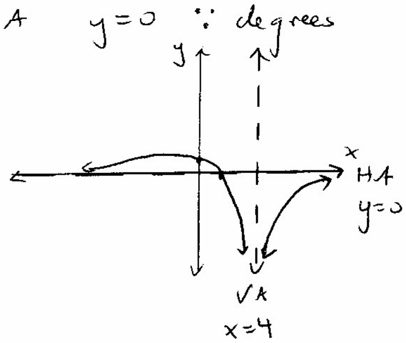
$f(0) = \frac{5}{8}$

VA let $(x-4)^2=0$

$x=4$ DR

∴ arrows in same direction

HA $y=0$ ∵ degrees




D: $\{x \mid x \neq 4, x \in \mathbb{R}\}$

h) $f(x)=\dfrac{x^2+4}{x^2-4}$

h) $f(x) = \dfrac{x^2+4}{x^2-4}$

→ rational fnct

→ deg numerator = deg denominator ∴ HA

→ +ve lead. coeff. ∴ ends Q I

x-int let $x^2+4=0$ no sol$^n$

y-int let $x=0$

$f(0) = \frac{4}{-4}$

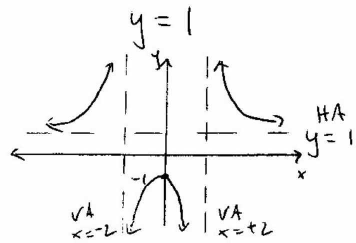
$f(0) = -1$

VA let $x^2-4=0$

$x = \pm 2$

HA ÷ coeff ∵ deg. equal

$y=1$




i) $y=2\sin\left(\theta-\dfrac{\pi}{2}\right)+1$

→ sine fnct

→ Amp : 2

P.S : $\frac{\pi}{2}$

V. disp = 1

Period = $2\pi$

y-int (let $\theta=0$)

$y = 2\sin\left(-\frac{\pi}{2}\right)+1$

$y = -2+1$

$y = -1$

x-int (let $y=0$)

$0 = 2\sin\left(\theta-\frac{\pi}{2}\right)+1$

$-1 = 2\sin\left(\theta-\frac{\pi}{2}\right)$

$-\frac{1}{2} = \sin\left(\theta-\frac{\pi}{2}\right)$

let $B = \theta - \frac{\pi}{2}$

$\frac{1}{2} = \sin B_r$

$\frac{\pi}{6} = B_r$

$B_1 = \pi + \frac{\pi}{6}$ $\qquad$ $B_2 = 2\pi - \frac{\pi}{6}$

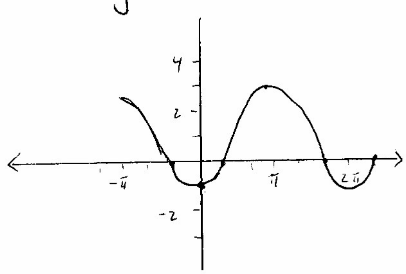
$\theta_1 - \frac{\pi}{2} = \frac{7\pi}{6}$ $\qquad$ $\theta_2 - \frac{\pi}{2} = \frac{11\pi}{6}$

$\theta_1 = \frac{7\pi}{6} + \frac{\pi}{2}$ $\qquad$ $\theta_2 = \frac{11\pi}{6} + \frac{\pi}{2}$

$\theta_1 = \frac{10\pi}{6}$ $\qquad$ $\theta_2 = \frac{14\pi}{6}$

$\theta_1 = \frac{5\pi}{3}$ $\qquad$ $\theta_2 = \frac{7\pi}{3}$

$\theta_3 = \frac{5\pi}{3} \pm 2n\pi$ $\qquad$ $\theta_2 = \frac{7\pi}{3} \pm 2n\pi$




D: $\{x \mid x \in \mathbb{R}\}$

j) $y = \tan 2\theta - 1$

j) $y = \tan 2\theta - 1$

$\rightarrow$ tangent fnct, VA

$\rightarrow$ Period $= \frac{\pi}{2}$

v. shift down 1

y-int (let $\theta = 0$)

$y = \tan 0 - 1$

$y = -1$

x-int (let $y=0$)

$0 = \tan 2\theta - 1$

$1 = \tan 2\theta$

let $B = 2\theta$

$1 = \tan B$

$\frac{\pi}{4} = B_1 \qquad B_2 = \frac{5\pi}{4}$

$\frac{\pi}{8} = \theta_1 \qquad \theta_2 = \frac{5\pi}{8}$

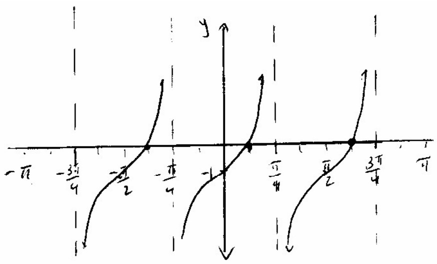
$\frac{\pi}{8} \pm \frac{n\pi}{2} = \theta_3 \qquad \theta_4 = \frac{5\pi}{8} \pm \frac{n\pi}{2}$

VA: for $y = \tan\theta$

VA $x = \frac{\pi}{2}$

H compression

$x = \frac{\pi}{4}$




D: $\{x \mid x \neq \frac{\pi}{4} + n\pi,\ n \in \mathbb{Z},\ x \in \mathbb{R}\}$

k) $y = 0.5\sec\left(\theta + \frac{\pi}{4}\right)$

$\rightarrow$ secant fnct.

$\rightarrow$ reciprocal of cosine

$\rightarrow$ Amp not applicable

H. shift left $\frac{\pi}{4}$

y-int (let $\theta = 0$)

$y = 0.5 \sec\left(\frac{\pi}{4}\right)$

$y = 0.5 \cdot \frac{1}{\cos\frac{\pi}{4}}$

$y = 0.5 \cdot \frac{\sqrt{2}}{1}$

$y = \frac{\sqrt{2}}{2}$

$y \doteq 0.7071$

x-int (let $y=0$)

$0 = 0.5 \sec\left(\theta + \frac{\pi}{4}\right)$

$0 = \sec\left(\theta + \frac{\pi}{4}\right)$

$0 = \frac{1}{\cos\left(\theta + \frac{\pi}{4}\right)}$

$\cos\left(\theta + \frac{\pi}{4}\right) = $ undef.

not possible.

VA for $y = \sec\theta$

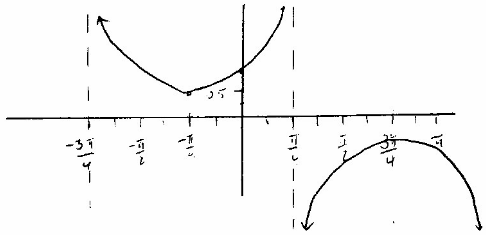
when $\theta = \frac{\pi}{2} \pm n\pi$

(zeros of $y = \cos\theta$)

H. shift left $\frac{\pi}{4}$

$\therefore$ VA $\theta = \frac{\pi}{2} - \frac{\pi}{4} \pm n\pi$

$\theta = \frac{\pi}{4} \pm n\pi$




D: $\{x \mid x \neq \frac{\pi}{4} \pm n\pi,\ n \in \mathbb{Z},\ x \in \mathbb{R}\}$

10) Analyze and sketch the following, using intercepts, asymptotes, and end behaviours:

$$y=\frac{3x^3+10x^2+3x}{x^2+5x+6}$$

zeros: let $3x^3+10x^2+3x=0$

$x(3x^2+10x+3)=0$

$x(3x+1)(x+3)=0$

$x=0,\ x=\frac{-1}{3},\ x=-3$

y-int let $x=0$

$y=\frac{0}{6}$

$y=0$

O.A.:

$$\begin{array}{r} 3x-5 \\ x^2+5x+6\,\overline{)\,3x^3+10x^2+3x+0} \\ -(3x^3+15x^2)\quad\quad \\ \hline -5x^2+3x+0 \\ -(-5x^2-25x-30) \\ \hline 28x+30 \end{array}$$

O.A. $y=3x-5$

VA let $x^2+5x+6=0$

$(x+3)(x+2)=0$

$x=-3,\ x=-2$

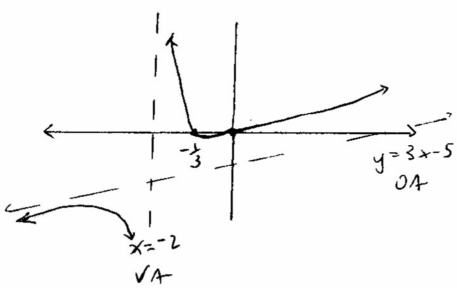
same as zero ∴ hole; $x=-2$ VA

hole: $y=\frac{x(3x+1)}{x+2}$

$y=\frac{-3(-8)}{-1}$

$y=-24$

$(-3,-24)$




11) A polynomial of degree 5 has a negative leading coefficient.

a) How many turning points could the polynomial have?

b) How many zeros could the function have?

c) Describe the end behaviour.

d) Sketch two possible graphs, each passing through the point $(1,\ -2)$.

poly of deg 5

$\Rightarrow n=5$

a) max # of turning pts $=n-1$

$=4$

∴ 0, 2 or 4 turning pts

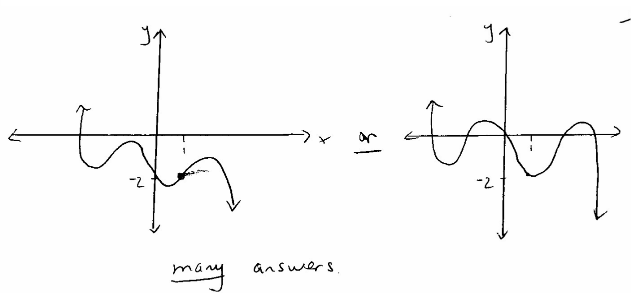
b) max # of zeros $=n$ odd deg.

$=5$

# zeros 1, 2, 3, 4 or 5

c) -ve lead. coeff ∴ as $x\to\infty$, $y\to-\infty$

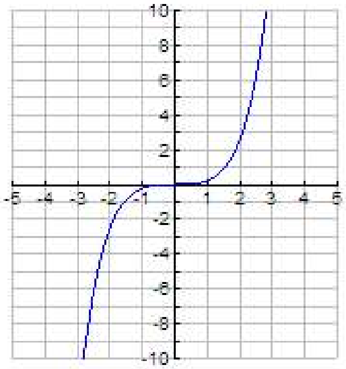
odd deg as $x\to-\infty$, $y\to\infty$



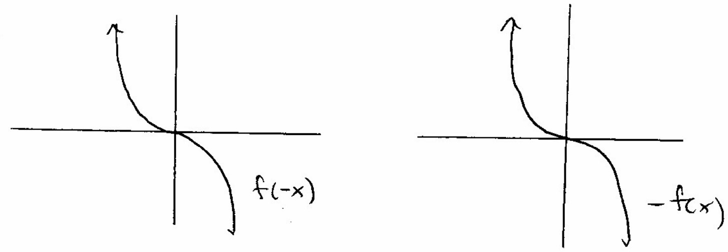
Symmetry:

12) Determine whether each of the following functions is even, odd, or neither. Justify your answer.

a)

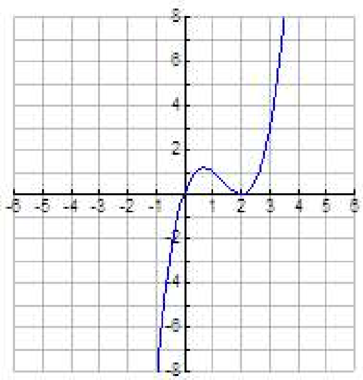


a)




$f(-x) = -f(x)$ ∴ odd fnct.

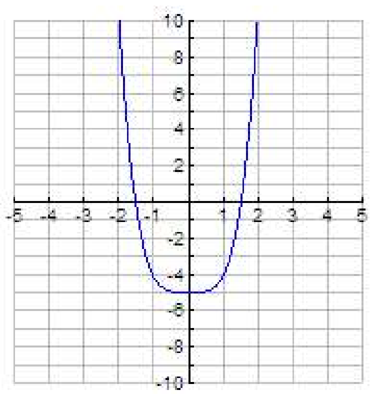
b)



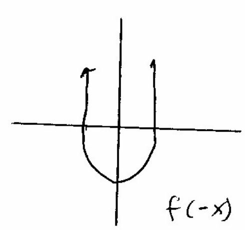
b)


$f(x) \neq f(-x)$, $f(-x) \neq -f(x)$ ∴ neither odd nor even

c)



c)



$f(-x) = f(x)$ ∴ fnct is even

d) $f(x) = 3x^2 + 4$

d) $f(x) = 3x^2 + 4$

$f(-x) = 3(-x)^2 + 4$

$f(-x) = 3x^2 + 4$

$f(-x) = f(x)$

∴ fnct is even

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

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

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

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

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

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

$-f(x) = f(-x)$

∴ odd fnct

f) $f(x) = \tan x$

f) $f(x) = \tan x$, assume $x \in QI$

$f(-x) = \tan(-x)$ $\quad -x \in Q\text{IV}$ tan ratio is $-$ve in $Q\text{IV}$

$f(-x) = -\tan x$

$-f(x) = -\tan x$

$-f(x) = f(-x)$ $\therefore$ odd fnct

g) $y = 3^x + 1$

g) $y = 3^x + 1$

let $y = f(x)$

$f(x) = 3^x + 1$

$f(-x) = 3^{-x} + 1$

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

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

$f(-x) \neq f(x)$

$f(-x) \neq -f(x)$

$\therefore$ fnct is neither odd nor even.

h) $f(x) = 3\log x - 1$

h) $f(x) = 3\log x - 1$

$f(-x) = 3\log(-x) - 1$

$-f(x) = -(3\log x - 1)$

$-f(x) = -3\log x + 1$

$f(-x) \neq f(x)$

$f(-x) \neq -f(x)$

$\therefore$ fnct neither odd nor even

i) $y = \dfrac{1}{x^2 - 4}$

i) $y = \dfrac{1}{x^2-4}$

let $y = f(x)$.

$f(-x) = \dfrac{1}{(-x)^2-4}$

$f(-x) = \dfrac{1}{x^2-4}$

$f(-x) = f(x)$

$\therefore$ fnct is even

j) $f(x) = 2^x + 2^{-x}$

j) $f(x) = 2^x + 2^{-x}$

$f(-x) = 2^{-x} + 2^{-(-x)}$

$f(-x) = 2^{-x} + 2^x$

$\because$ addition is commutative

$f(-x) = 2^x + 2^{-x}$

$f(-x) = f(x)$

$\therefore$ fnct is even

k) $f(x) = \dfrac{\sin x}{x^2 - 4}$

(use combinations of functions to justify)

k) $f(x) = \dfrac{\sin x}{x^2-4}$

$y = \sin x$ is an odd fnct

$y = x^2 - 4$ is an even fnct.

The quotient of an odd and an even fnct is odd

l) $f(x) = x \cdot \log x$

(use combinations of functions to justify)

l) $f(x) = x \cdot \log x$

$y = x$ is an odd fnct

$y = \log x$ is neither odd nor even

The product of an odd and a neither is a neither.

Rates of Change:

13) The position in kilometres of a particle at t hours is given by $d(t)=t^3-12t^2+34t+75$, where $t\geq 0$.

a) What is the initial position of the particle?
b) What is the particle's average velocity from 3 hours to 5 hours?
c) What is the particle's instantaneous velocity at 7 hours?

a) initial position $\Rightarrow t=0$

$d(0)=75$

The initial position is 75 km.

b) avg. vel'y = avg. R.o.C of $d(t)$

avg. vel'y $= \dfrac{d(5)-d(3)}{5-3}$

avg. vel'y $= \dfrac{70-96}{2}$

avg. vel'y $= -13$

The ptcles avg. vel'y from 3 hrs. to 5 hrs. is $-13$ Km/hr.

or The position is decr. at an avg. RoC of 13 Km/hr.

c)

| nbhd pt | pt. | $\Delta t$ | $\Delta d(t)$ | $\frac{\Delta d(t)}{\Delta t}$ |
|---|---|---|---|---|
| (6.9, 66.789) | (7, 68) | 0.1 | 1.211 | 12.11 |
| (6.99, 67.8709) | (7, 68) | 0.01 | 0.1291 | 12.91 |
| (7.01, 68.1309) | (7, 68) | -0.01 | -0.1309 | 13.09 |
| (7.1, 69.391) | (7, 68) | -0.1 | -1.391 | 13.91 |

$\downarrow$ 13 $\uparrow$

The inst. rate of change, at $t=7$ hrs, is 13 Km/hr.

14) Find the slope of the secant of $y=2^x-3$ that passes through the points where $x=-3$ and $x=1$.

$y=2^x-3$

$m_{sec} = \dfrac{\Delta y}{\Delta x}$

$= \dfrac{y|_{x=1} - y|_{x=-3}}{1-(-3)}$

$= \dfrac{-1+2.875}{4}$

$\doteq 0.47$

15) The concentration of medicine in a patient's bloodstream is given by $C(t)=\dfrac{0.4t}{(0.3t+2)^3}$, $t \geq 0$, where $C$ is measured in milligrams per cubic centimetre and $t$ is the time in hours after the medicine was taken. Determine:

a) the concentration in the bloodstream 3 hours after the medicine was taken.

b) the average rate at which the concentration is decreasing from 4 hours after taking the medicine to 7 hours after taking the medicine.

c) the instantaneous rate of change for the concentration 2 hours after the medicine was taken. Interpret the meaning of your answer.

a) $C(3) = \dfrac{0.4(3)}{[(0.3)(3)+2]^3}$

$C(3) \doteq 0.0492$

After 3 hrs the conc. is 0.0492 mg/cm³

b) avg. RoC $= \dfrac{\Delta C(t)}{\Delta t}$

avg. RoC $= \dfrac{C(7)-C(4)}{7-4}$

avg. RoC $\doteq \dfrac{0.0406-0.0488}{3}$

avg. RoC $\doteq -0.0027$

The conc. is decr. at an avg. RoC of 0.0027 mg/cm³/hr.

c)

| nbhd Pt | Pt. | $\Delta t$ | $\Delta C(t)$ | $\frac{\Delta C(t)}{\Delta t}$ |
|---|---|---|---|---|
| (1.9, 0.0448) | (2, 0.0455) | 0.1 | 0.0007 | 0.007 |
| (1.99, 0.04545) | (2, 0.04552) | 0.01 | 0.00007 | 0.007 |
| (2.01, 0.04559) | (2, 0.04552) | -0.01 | -0.00007 | 0.007 |
| (2.1, 0.0462) | (2, 0.0455) | -0.1 | -0.0007 | 0.007 |

The inst. RoC is approx. 0.007 mg/cm³/hr. The conc. is increasing slightly.

16) Complete the table