$45 \times \frac{\pi}{180}$ $\frac{\pi}{4}$ $\pi\frac{12}{4}$

$f(x) = \sin x + \cos x$
$f'(x) = \cos x - \sin x$
$0 = \cos x - \sin x$
$\sin x = \cos x$
$x = \frac{\pi}{4}$

1) $y = f(x) = x^3 - 9x^2 + 24x$
$f'(x) = 3x^2 - 18x + 24$
$f''(x) = 6x - 18$

①. Domain $(-\infty, \infty)$

2. x-intercept put $y=0$ $x(x^2-9x+24)=0$
$x=0$ or $x^2-9x+24=0$

y-intercept, put $x=0$ $y=0$.
$\therefore$ the graph passes through the $(0,0)$

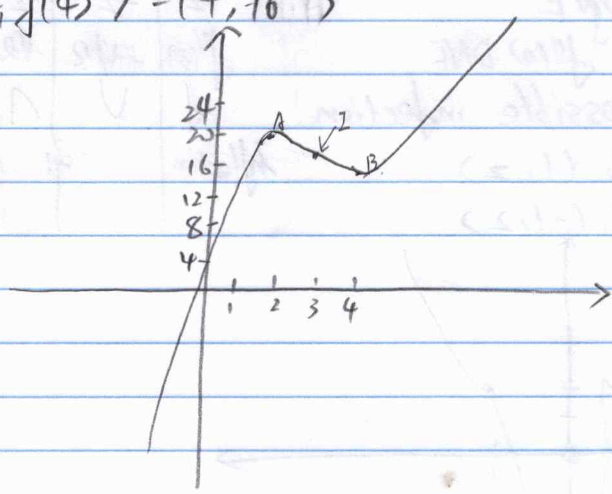
3. None

4. $f(-x) = -x^3 - 9x^2 - 24x \neq f(x)$. No symmetry
$\neq -f(x)$

5. $f'=0 = 3(x^2-6x+8)=0$
$(x-4)(x-2) = 0$
$x = 2, 4$

criticle point
A: $(2, f(2)) = (2, 20)$
B: $(4, f(4)) = (4, 16)$

I	$(-\infty, 2)$	$(2, 4)$	$(4, \infty)$
z	0	3	10
$f'(z)$	$\nearrow$ +ve	-ve $\searrow$	+ve $\nearrow$
FD		Rel max at A	Rel min at B.



6. put $f''(0)$ $6x - 18 = 0$
$x = 3$.
Possible inflection $(3, 18)$

I	$(-\infty, 3)$	$(3, \infty)$
z	0	20
$f''(z)$	-ve	+ve
f	CD	CU.

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

$f'(x) = 6x + 2x^{-3}$

$f''(x) = 6 - 6x^{-4}$

1. Domain: $(-\infty, 0) \cup (0, \infty)$

2. No y intercept

x intercept

$0 = 3x^2 - \frac{1}{x^2}$

$\frac{1}{x^2} = 3x^2$

$1 = 3x^4$

$\frac{1}{3} = x^4$

$x = \pm\sqrt[4]{\frac{1}{3}}$

$= \pm 0.76$

3. V.A. $\lim_{x\to 0^+} (3x^2 - \frac{1}{x^2}) = -\infty$

$\therefore x = 0$ V.A.

H.A. $\lim_{x\to\infty} (3x^2 - \frac{1}{x^2}) = \infty$.

NO. H.A.

4. $f(-x) = 3x^2 - \frac{1}{x^2} = f(x)$.

5. $f'(x) = 6x + 2x^{-3}$

$0 = 6x + 2x^{-3}$

$\frac{6x^4 + 2}{x^3} = 0$

$6x^4 = -2$

$f'(0)$ DNE

but 0 not in the domain

$\therefore$ NO critical numbers.

6. Concavity

$f''(0)$ or DNE

$x^4 = 1$

$x = \pm 1$

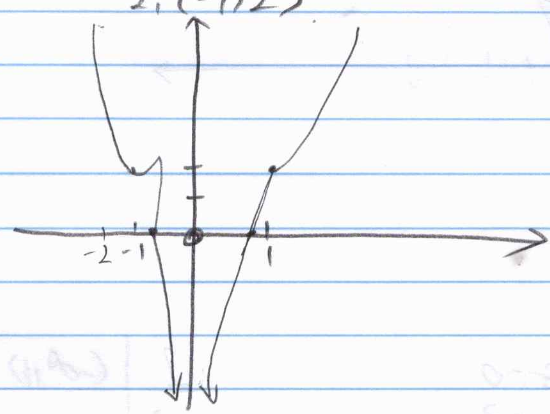
$f''(0)$ DNE

possible infection

I_1 (1, 2)

I_1 (−1, 2)

I	$(-\infty,-1)$	$(-1,0)$	$(0,1)$	$(1,\infty)$
Z	−2	$-\frac{1}{2}$	$\frac{1}{2}$	2
$f''(z)$	+ve	-ve	-ve	+ve.
f	∪	∩	∩	∪
Inflection		I_1		I_2.



9.6