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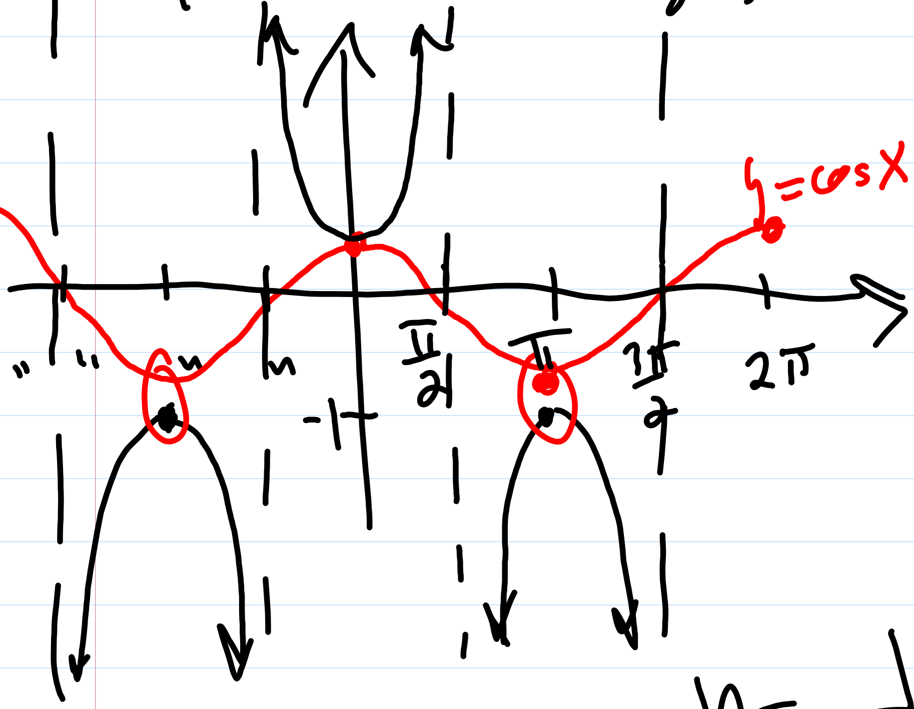
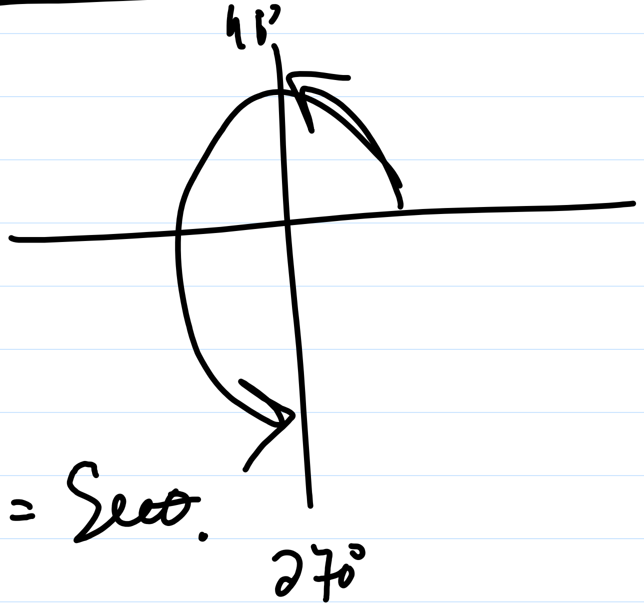
Exam Review

Part A (Knowledge)



VAs at $X = \frac{\pi}{2}, \frac{3\pi}{2}$.

$$y = \frac{1}{\cos\theta} = \sec\theta.$$



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2) $y = 40 \cos \boxed{\frac{2\pi}{12}} x$

~~$y = 40 \sin \frac{2\pi}{12} x$~~

$\boxed{B}$

$$\frac{2\pi}{12} = \frac{\pi}{6} k$$

$$P = \frac{2\pi}{\frac{\pi}{6}}$$

$$= \boxed{12}$$

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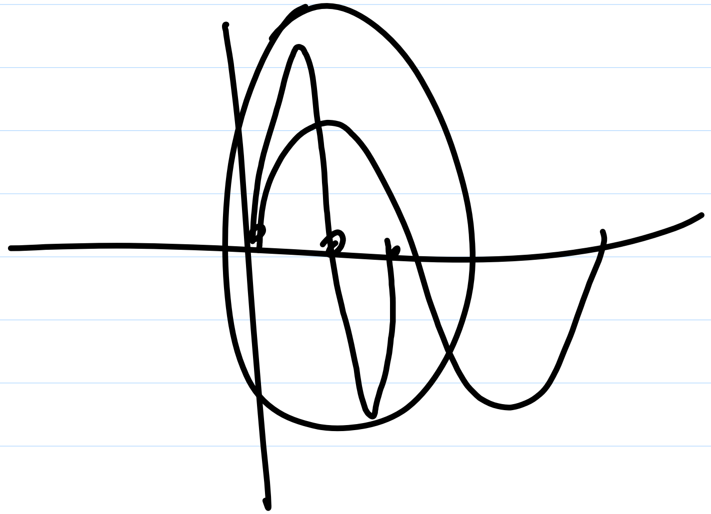
3) $y = 5\sin 4x$

$\uparrow$

$k = 4$

$p = \frac{2\pi}{4} = \boxed{\frac{\pi}{2}}$



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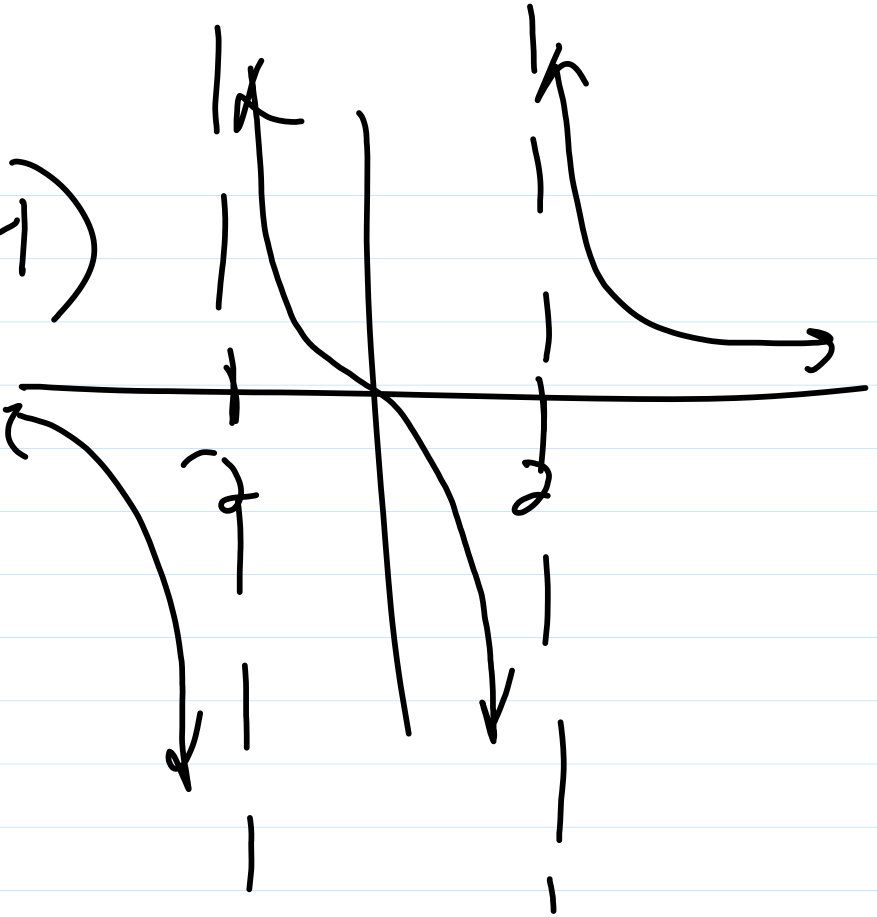
4)



A. $y = \cancel{\dfrac{-x^2}{x^2-4}}$

B. $y = \dfrac{x}{x^2-4}$

C. $y = \cancel{\dfrac{x^3}{x^2-4}}$

D. $y = \cancel{\dfrac{x^2}{x^2-4}}$

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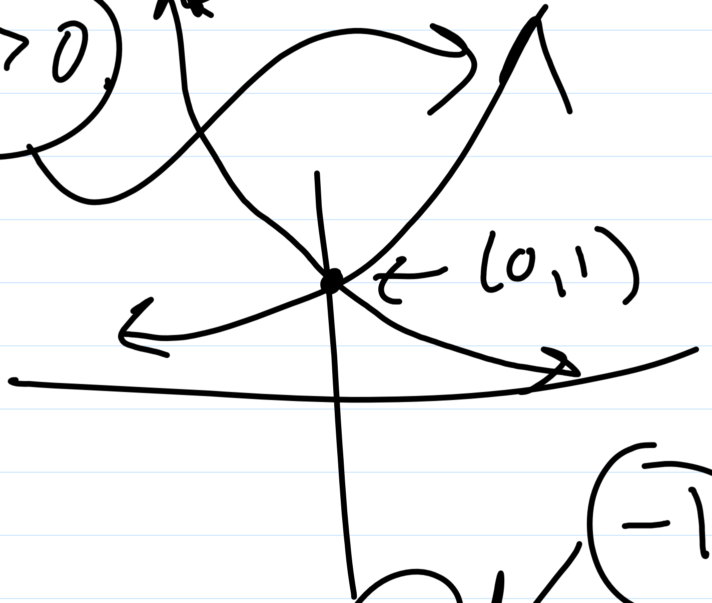
5) $y = a^x$ $a > 0$

$0 < a < 1$



6) $(2x^3 + 1x^2 - 12 - 11x) \div (x+1)$

-1

$-1 \,|\, 2 \quad 1 \quad -11 \quad -12$

$$\begin{array}{r|rrr|l} + & -2 & 1 & 10 & \\ \hline & 2 & -1 & -10 & \boxed{-2R} \end{array}$$

$P(x) = d(x)q(x) + R,$

$P(x) = (x+1)(2x^2 - x - 10) + (-2)$

7) $(x^4 - 4x^2 + 5x - 1) \div (x-2) \rightarrow 2$

$P(2) = \#R$ by R.T.

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$2^4 - 4(2)^2 + 5(2) - 1 = 9\ R.$

8) Solve.

roots!!

a) $x^3 - 4x^2 - 7x + 10 \boxed{= 0}$

factors: $(x-2)(x+7)(x) = 0$

$P(1) = 0\ R$ by R.T.

$(x-1)$ factor by F.T.

b) $\dfrac{7x+3}{x^2+x} = \dfrac{2}{1}$

$7x+3 = 2x^2 + 2x$

$0 = 2x^2 - 5x - 3$

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

$0 = 2x(x-3) + 1(x-3)$

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$$\begin{array}{c|cccc} 1 & 1 & -4 & -7 & 10 \\ + & & 1 & -3 & -10 \\ \hline & 1 & -3 & -10 & \boxed{0R} \end{array}$$

$0 = (2x+1)(x-3)$

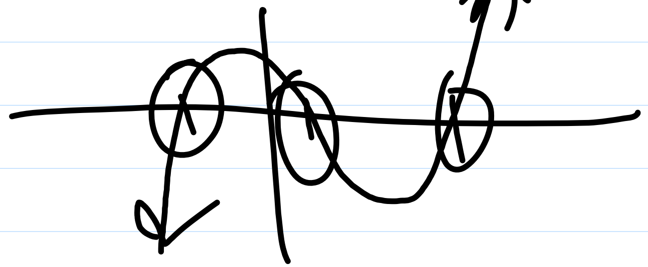
Ans: $x = \frac{-1}{2}, +3$

$p(x) = (x-1)(x^2-3x-10)$ t.o.R.

more factors.

$= (x-1)(x-5)(x+2)$

Ans: $x = 1, -2, 5$



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1) $\frac{x+2}{x-1} \le \boxed{\frac{x+1}{x-3}}$

$(x-1)$

$(x-3) \times \boxed{\frac{x+2}{x-1} - \frac{x+1}{x-3} \le 0}$

$$\frac{(x-3)(x+2) - (x+1)(x-1)}{(x-1)(x-3)} \le 0$$

$$\frac{\cancel{x^2}+2x-7x-6-(\cancel{x^2}-1)}{☺} \le 0$$

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$\frac{\ominus 2}{2(+\text{small})} \to +\infty$

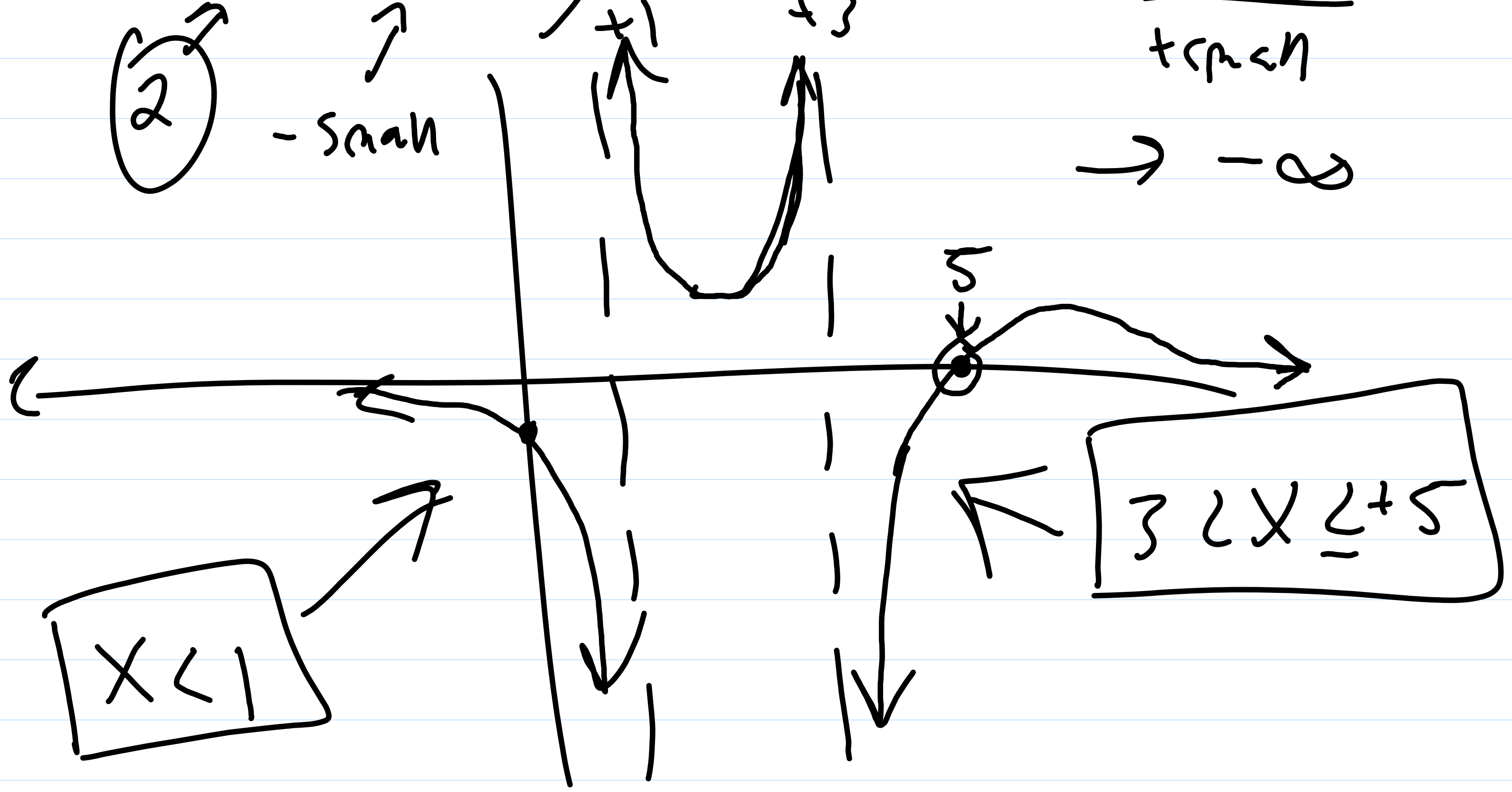
$\frac{1}{(+\text{small})}$

$$\frac{(x-5)^{-2}}{(x-1)(x-3)} \le 0$$

$\textcircled{2}$ -small

$\frac{-\#}{2(+\text{small})} = \frac{-\#}{+\text{small}} \to -\infty$

HA
$y=0$



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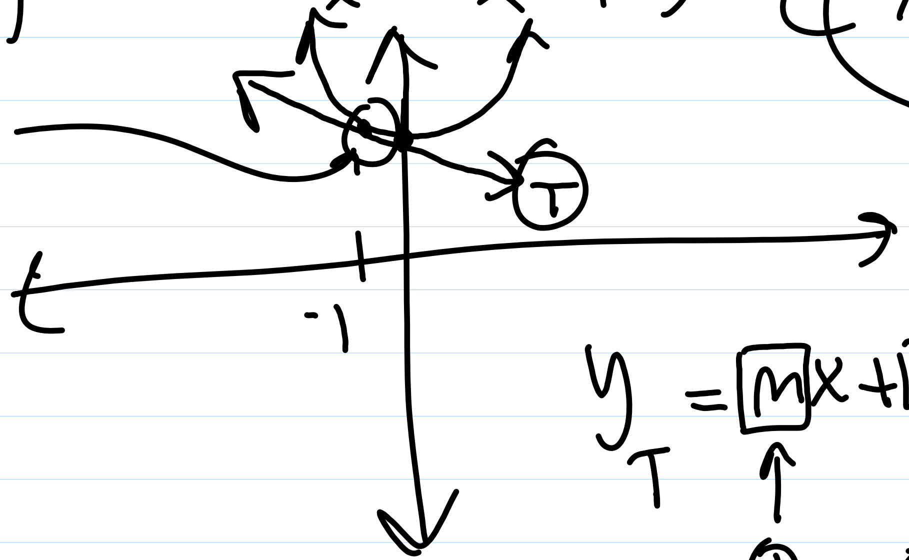
10) Tangent Eqn:

$f(x) = +x^2 - x + 3$ @ $x = -1$

$P(x, y)$

$P(-1, 5)$



$$y_T = \underset{\overset{\uparrow}{①}}{\boxed{m}}x + \underset{\overset{\uparrow}{②}}{\boxed{b}}$$

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$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

↓

IROC

↓

m_T

$$f'(-1) = \lim_{\Delta x \to 0} \frac{\overset{\downarrow}{f(-1+\Delta x)} - \overset{5}{\overset{\downarrow}{f(-1)}}}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\left[(-1+\Delta x)^2 - (-1+\Delta x) + 3\right] - 5}{\Delta x}$$

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$(-1+\Delta x)(1+\Delta x)$

$1-2\Delta x+\Delta x^2$

$$= \lim_{\Delta x \to 0} \frac{1-\cancel{2\Delta x}+\cancel{\Delta x^2}+1-\cancel{\Delta x}+3-5}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{\Delta x^2-3\Delta x}{\cancel{\Delta} x}$$

$$= \lim_{\Delta x \to 0} \frac{\cancel{\Delta x}(\Delta x-3)}{\cancel{\Delta x}}$$

$$= \lim_{\boxed{\Delta x \to 0}} \boxed{\Delta x}-3$$

$$= \boxed{-}3$$

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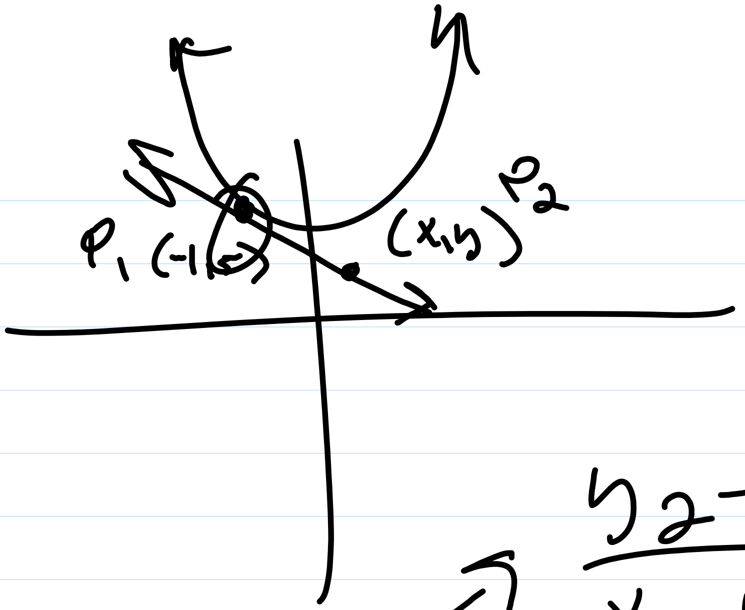
$M_T = -3$



$y_T = \overset{\checkmark}{m_T} x + b$

$\uparrow$

$(y_2 - y_1) = m(x_2 - x_1) \leftrightarrow \dfrac{y_2 - y_1}{x_2 - x_1} = m$

$y - 5 = -3(x - (-1))$

$y - 5 = -3(x + 1)$

$y_T = -3x - 3 + 5$

$\boxed{y_T = -3x + 2}$

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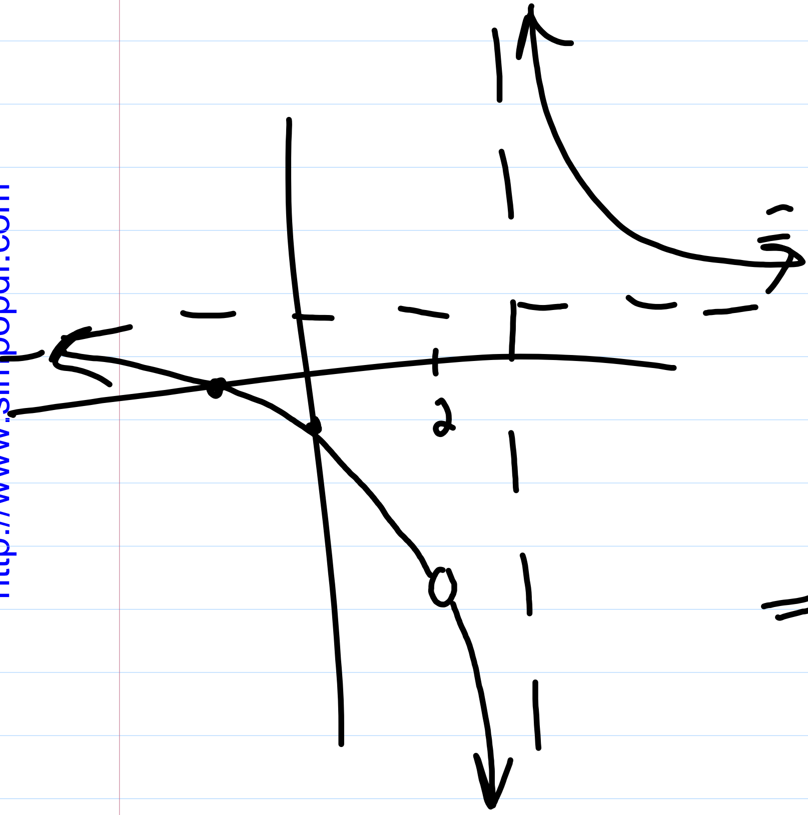
10)

$$f(x) = \frac{x^2-x-2}{x^2-5x+6}$$

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

h.ut
x=2,



$$= \frac{1x+1}{1x-3}$$

HA $y=1$

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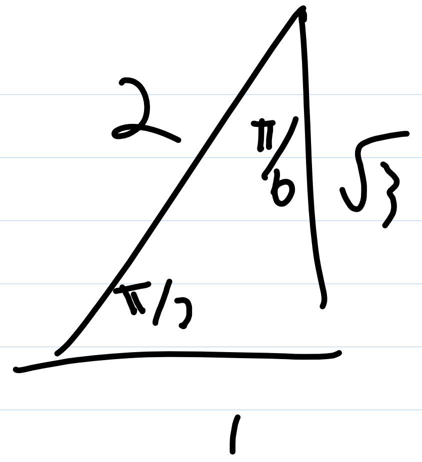
Part B: Apps.



1) Solve for x $\quad 0 \leq x \leq 2\pi$.

Refer to trig 1+2 test (Kuhlig).

2) $y = \cos x + q \quad (\pi/3, 1)$

$x \quad y$

$1 = \cos\frac{\pi}{3} + q$

$q = 1 - \cos(\pi/3)$

$q = 1 - \frac{1}{2}$

$= \frac{1}{2}$

$\boxed{y = \cos x + \frac{1}{2}}$

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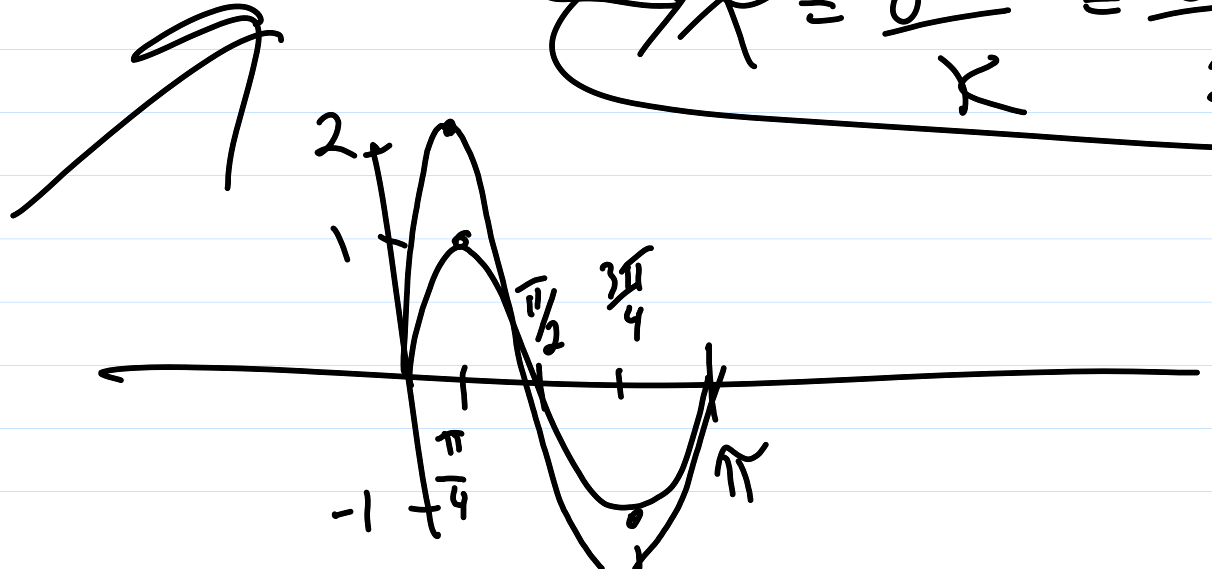
3)

$$y = 2\sin(2x+\pi) - 1$$

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

$$\quad a \qquad k \qquad c$$

$$P = \frac{2\pi}{k} = \frac{2\pi}{2} = \pi.$$



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

$= \textcircled{-2}\sin\frac{1}{2}(x+\pi) + \textcircled{1}$

a.) ps ← π unit

b) $P = \frac{2\pi}{k} = \frac{2\pi}{1/2} = 4\pi$

c) 2

d) 3 max

e) −1

f) $-1 \leq y \leq 3$

g) | ↑

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5) Solve

$-2\pi \le x < 2\pi$

a) $(2\cos x + \sqrt{3})(\cos x - 1) = 0$

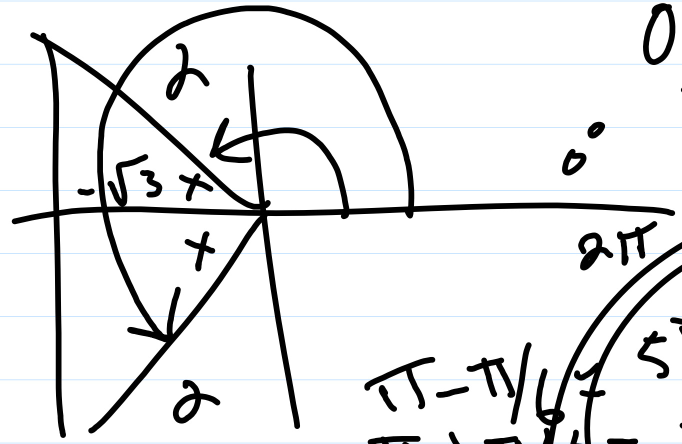
$\Rightarrow$ ① $2\cos x + \sqrt{3} = 0 \Rightarrow \cos x = -\frac{\sqrt{3}}{2}$

② $\cos x - 1 = 0 \Rightarrow \cos x = 1$

$0 \le x \le 2\pi$

$-2\pi \le x \le 0$

①



$\pi - \pi/6 = 5\pi/6$

$\pi + \pi/6 = 7\pi/6$

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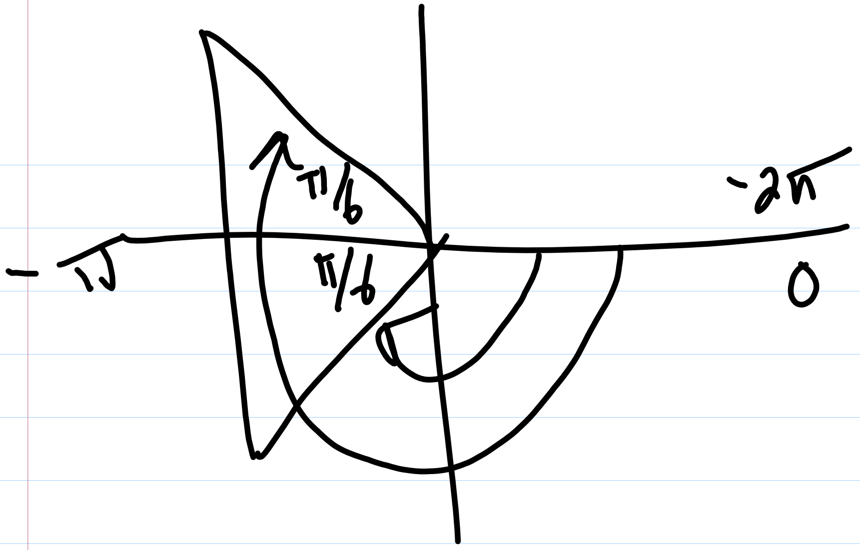
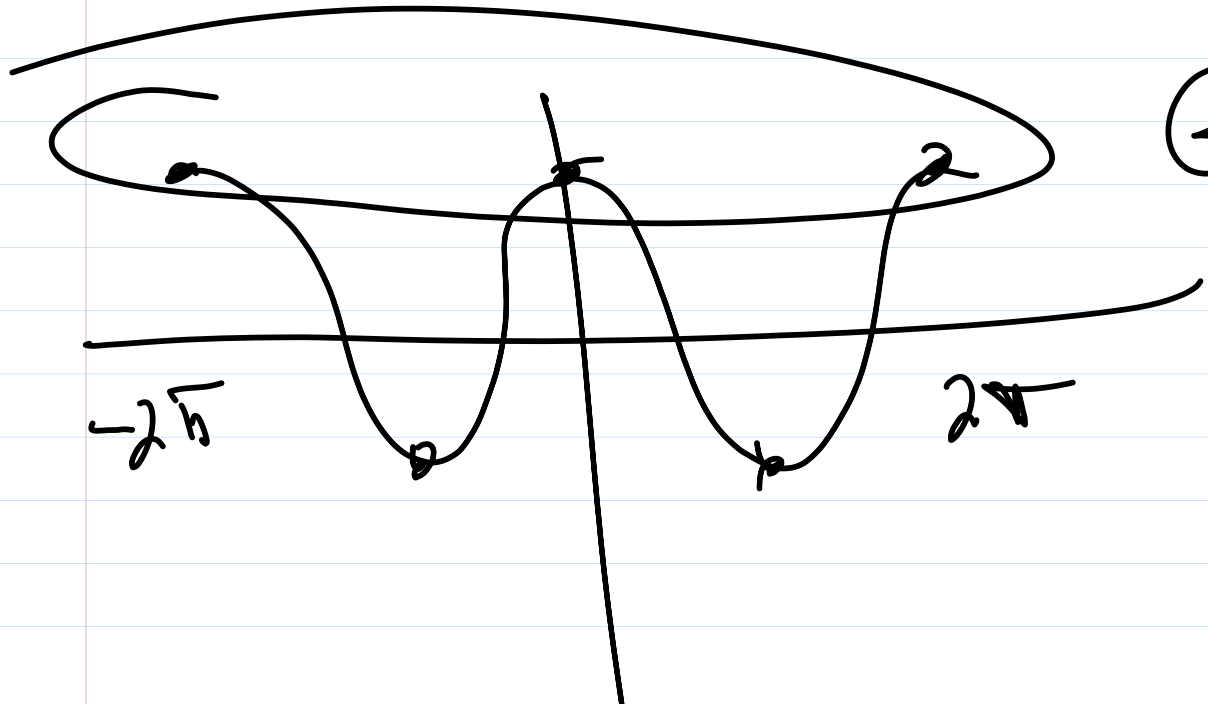


$$①\ -\left(\pi - \pi/6\right) = -\frac{5\pi}{6}$$

$$-\left(\pi + \pi/6\right) = -\frac{7\pi}{6}$$



② $\cos x = 1$

$x = 0, \pm 2\pi$

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b) $3(2)^{x} = 12^{x-1}$

$$\log(3)(2)^{x} = \log 12^{x-1}$$

$$\log 3 + \log 2^{x} = (x-1)\log 12$$

$$\log 3 + x\log 2 = x(\log 12) - \log 12$$

$$x\log 2 - x\log 12 = -\log 3 - \log 12$$

$$x(\log 2 - \log 12) = \boxed{-\log 3 - \log 12}$$

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$\log 2/12$

$\log \frac{1}{6}$

$x = \frac{\log \frac{1}{36}}{\log 1/6}$

$\boxed{x = 2}$

$\log 3^{-1} - \log 12$

$\log \frac{1}{3} - \log 12$

$\log \frac{1/3}{12}$

$\boxed{\log \frac{1}{36}}$

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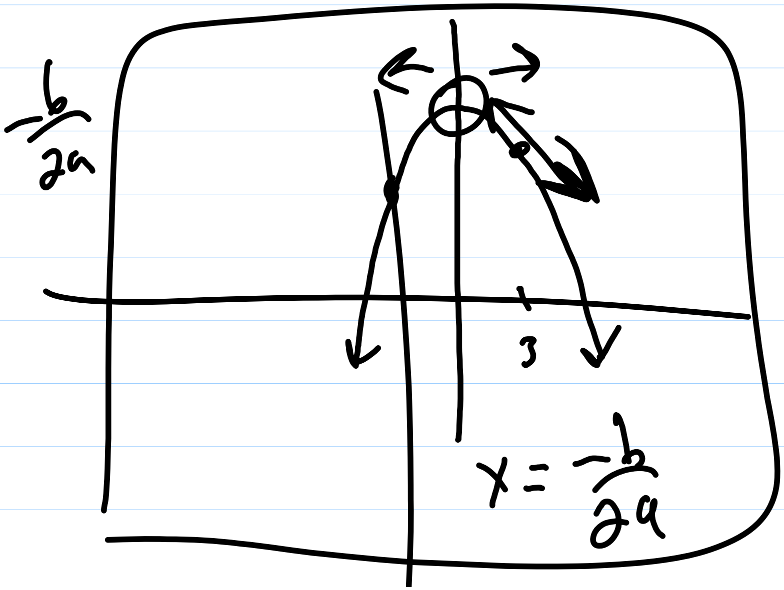
6) $h(t) = -4.9t^2 + \bigcirc\!\!\!\!14\,t + 1$

a) AROC $[0,1]$ sec.

$$AROC = \frac{h(1)-h(0)}{1-0} = \frac{10.1-1}{1} = \square \ m/s$$

b) your method :)



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$$x = \frac{-(14)}{2(-4.9)}$$

$$= 1.4$$

7) $$\frac{\sin^{2} x}{1-\cos x} = 1-\sin x+\cos x(\tan x+1)$$

$$\Uparrow$$

$$\frac{1-\cos^{2} x}{1-\cos x} = 1-\sin x+\cancel{\cos x}\left(\frac{\sin x+\cos x}{\cancel{\cos x}}\right)$$

$$\frac{(1+\cos x)\cancel{(1-\cos x)}}{\cancel{(1-\cos x)}} = 1-\cancel{\sin x}+\cancel{\sin x}+\cos x$$

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8)

$$\boxed{\log(2x-y) - \textcircled{2}\log(3x+2y)} - \log(x+y)$$

$$= \log\left[\frac{2x-y}{(3x+2y)^2}\right] - \log(x+y)$$

$$= \log \frac{2x-y}{(3x+2y)^2}\left(\frac{1}{x+y}\right)$$

$$= \log_{10} \frac{(2x-y)}{(3x+2y)^2(x+y)}$$

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a.)

Amp 2
P π
ps $\pi/2 \rightarrow$
vs 2 $\uparrow$

$P = \frac{2\pi}{K}$ or $K = \frac{2\pi}{P} = \frac{2\pi}{\pi} = 2$

$y = a\cos k(x-d)+c.$

$= 2\cos 2\left(x-\frac{\pi}{2}\right)+2.$

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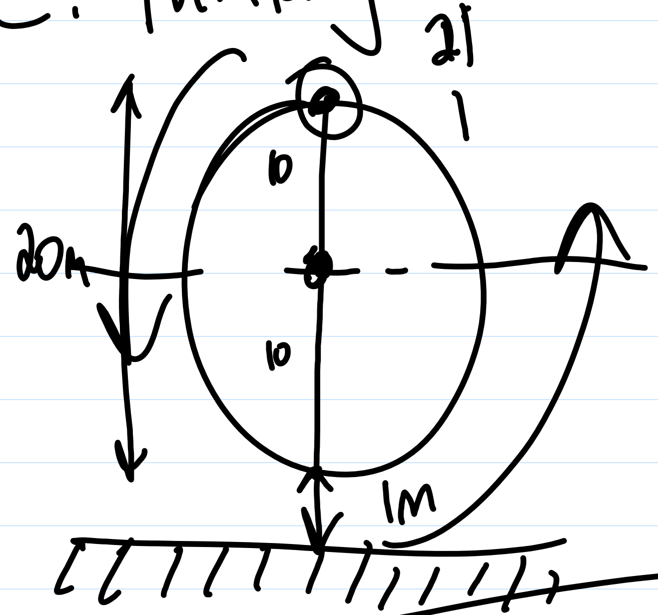
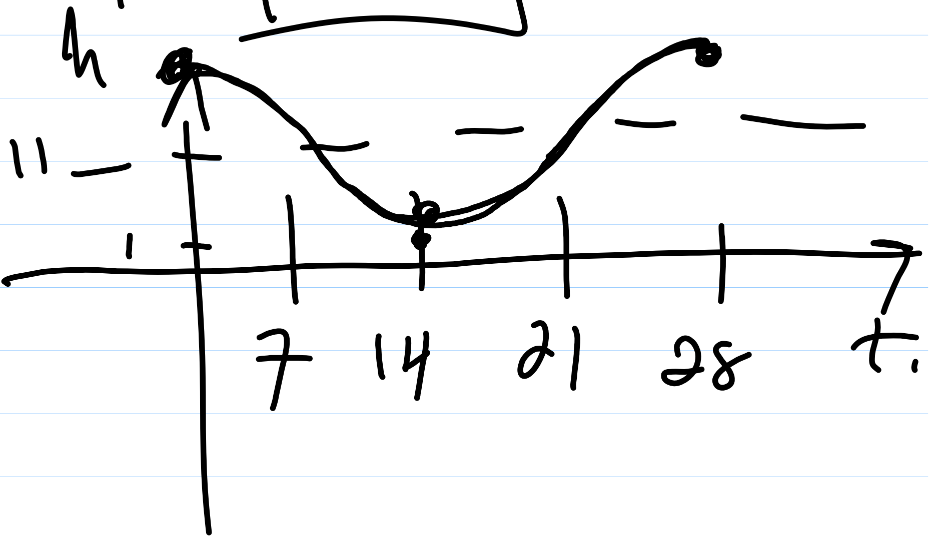
Part C: Thinking

1)



$1\text{rev} = \boxed{28 \text{ sec}}$



$$\boxed{h(t) = 10\cos\left[\boxed{\pi/14}\right](t) + 11}$$

$$k = \frac{2\pi}{P} = \frac{2\pi}{28} = \frac{\pi}{14}.$$

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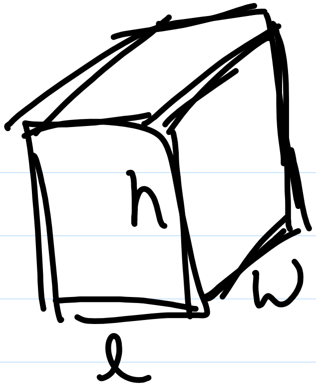
2)



$(18 + x)$
$(20 + x)$
$(6 + x)$,

$V = (18+x)(20+x)(6+x).$

$V \geq 5280$

$\boxed{(18+x)(20+x)(6+x)} \geq 5280,$

≥ 0

RZT

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3)

$$f(x) = \frac{ax+b}{cx+d}$$

$$= \frac{ax+b}{(3x+2)}$$

$$= \frac{4x+b}{3x+2}$$

$$= \frac{4x-1}{3x+2}$$

VA:

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

$$3x = -2$$

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

4)

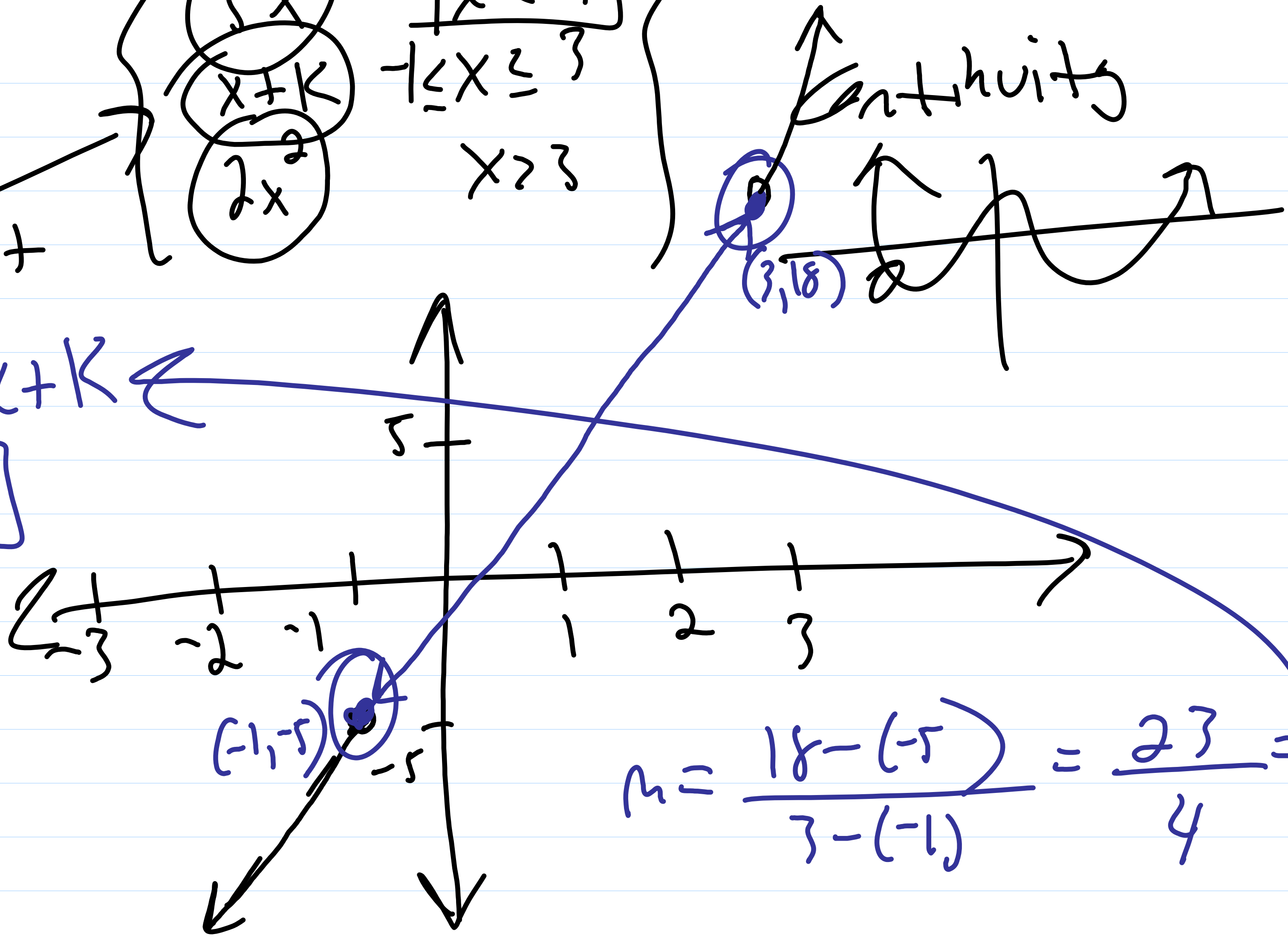
$$\begin{cases} 5x & \boxed{x < -1} \\ x+K & -1 \le x \le 3 \\ 2x^2 & x > 3 \end{cases}$$

Straight line

$\boxed{1}x + K$

$\boxed{m = 1}$

Continuity



$$m = \frac{18-(-5)}{3-(-1)} = \frac{23}{4} = \boxed{5.75}$$

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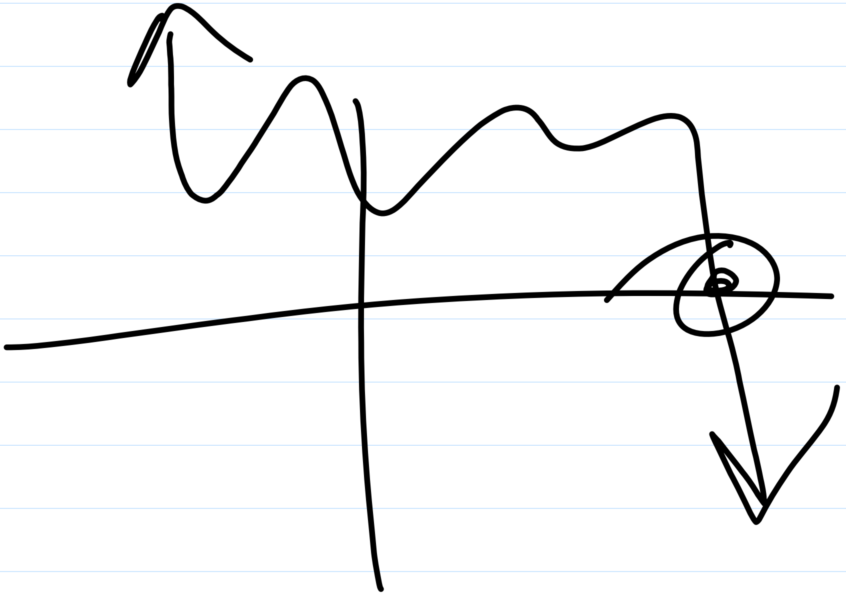
Part D

1) $\log 4^{x+1} = \log 16^{2-3x}$

$4^{x+1} = 4^{2(2-3x)}$ — change to base 4. Solve

$x + 1 = 4 - 6x$

2) $n = 7$



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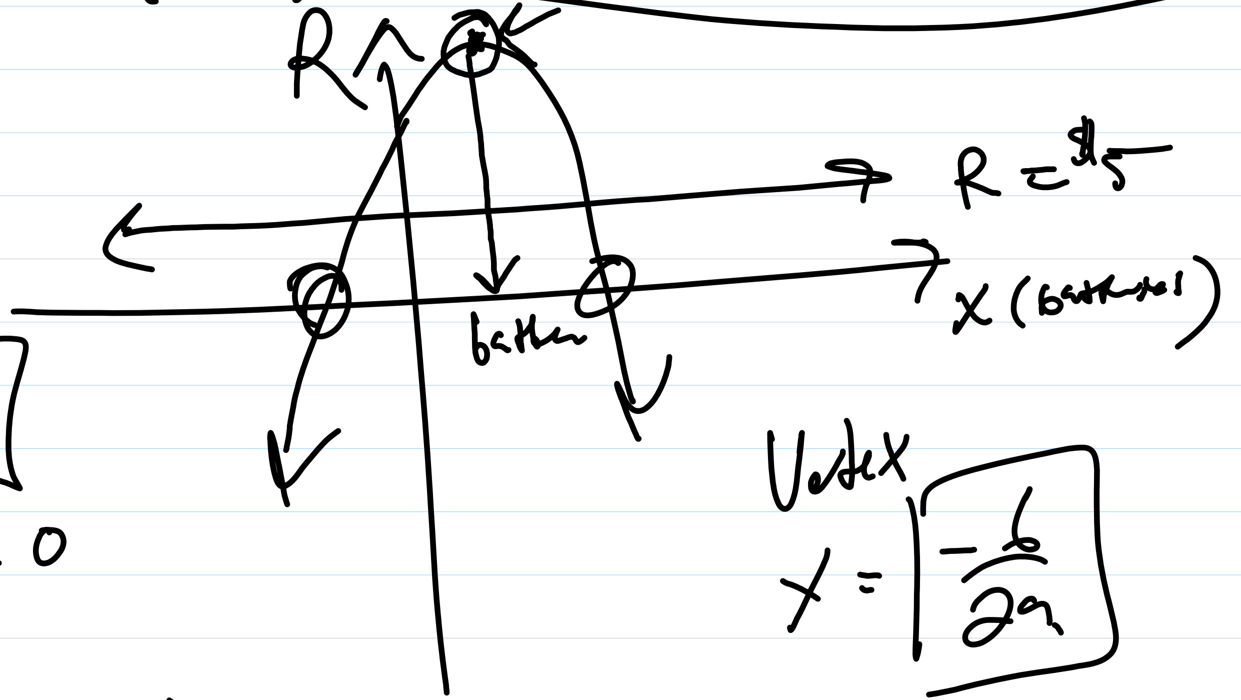
3)

$R(x) = -x^2 + 60x + 30000$



$\boxed{\text{Solve}}$

$R(x) = 0$

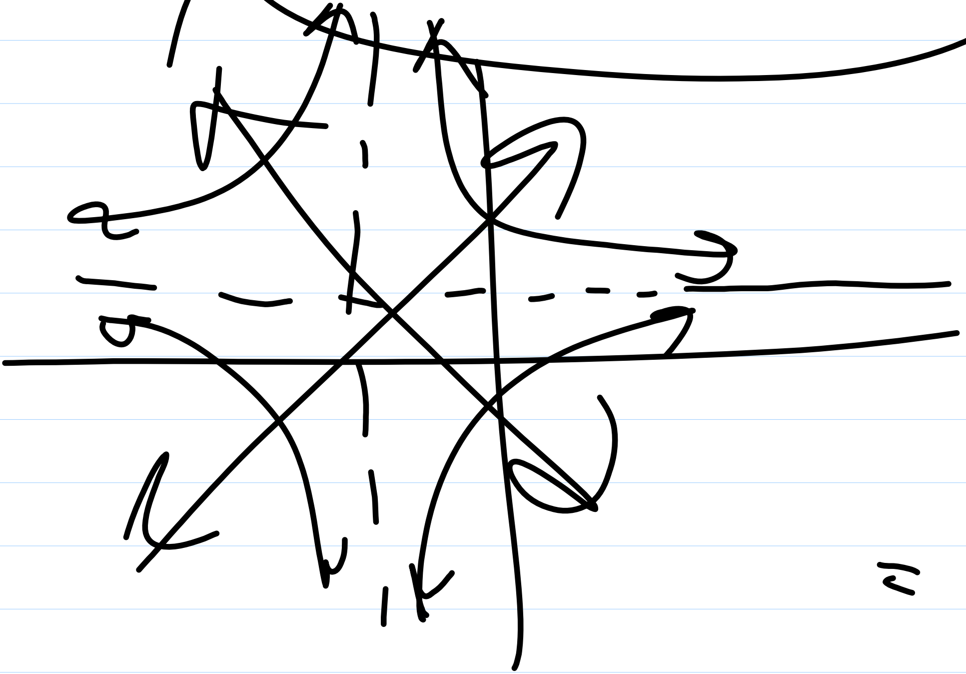
$R(x) > 5$

Vertex

$x = \boxed{\frac{-b}{2a}}$

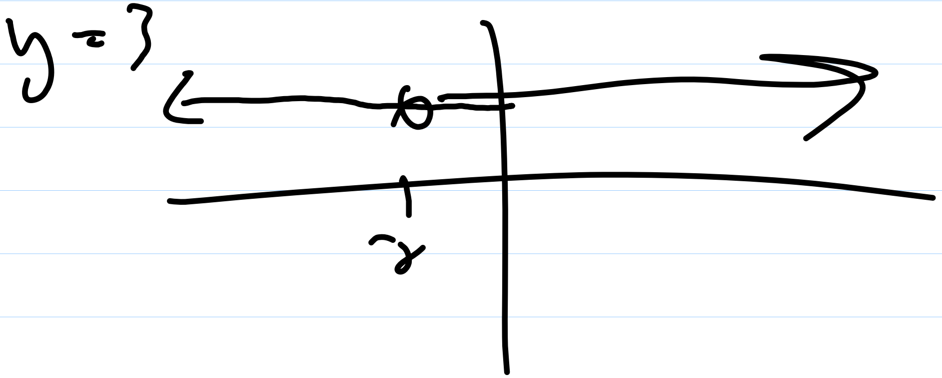
HA $y = \frac{a}{c}$ $x = -\frac{d}{c}$

4) $f(x) = \frac{ax+b}{cx+d} = \frac{3x+6}{2x+9}$



$= \frac{(3x+6)}{(x+2)}$

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



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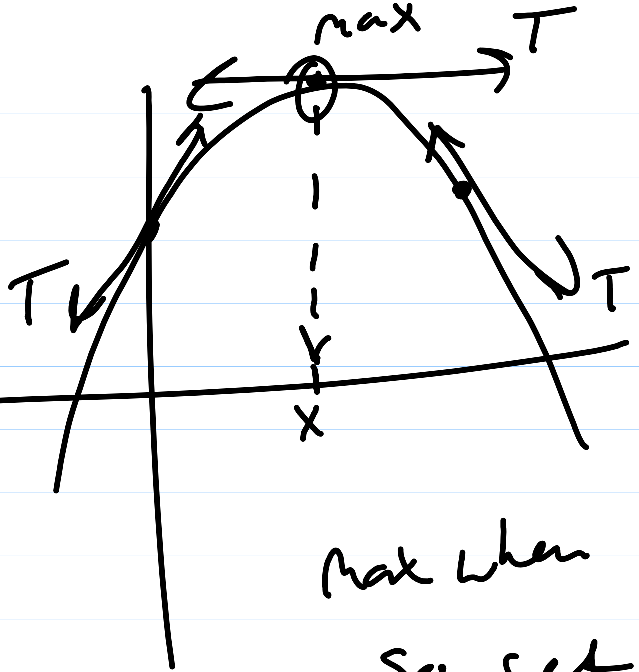
5)



max when $M_T = 0$
so set $f'(x) = 0$ and
Solve for x.