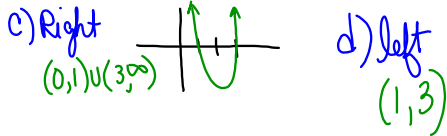


① $v(t) = 3t^2 - 12t + 9$ $x(t) = t^3 - 6t^2 + 9t$

a) $x(0) = 0^3 - 6(0)^2 + 9(0) = 0$

b) $0 = 3t^2 - 12t + 9$
 $0 = 3(t^2 - 4t + 3)$
 $0 = 3(t-3)(t-1)$

$t = 3 \text{ min}$ $t = 1 \text{ min}$



② $y^2 - xy = 2$ $\frac{dy}{dx} = \frac{y}{3y^2 - x}$

a) $(-1, 1)$ $\frac{1}{3(1)^2 - 1} = \frac{1}{4}$ (slope)

b) $y - 1 = \frac{1}{4}(x + 1)$

③ $f(x) = \frac{x^2 + 9x + 20}{x^2 - 16}$

$\frac{(x+4)(x+5)}{(x+4)(x-4)}$

a) $\lim_{x \rightarrow -4} \frac{-4+5}{-4-4} = \frac{-1}{8}$

b) $\lim_{x \rightarrow \infty} \frac{x+5}{x-4}$

EATSDC $\frac{1}{1} = 1$

④ $f(x) = x^2 + 3x - 5$ $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

$f(x+h) = (x+h)^2 + 3(x+h) - 5$

$x^2 + 2xh + h^2 + 3x + 3h - 5 - (x^2 + 3x - 5)$

$x^2 + 2xh + h^2 + 3x + 3h - 5 - x^2 - 3x + 5$

$\lim_{h \rightarrow 0} \frac{h(2x+h+3)}{h} = 2x+3$

Slope at $x = -2$ $2(-2) + 3 = -1$

Find y at $x = -2$ $(-2)^2 + 3(-2) - 5 = -7$

Slope = -1 at $(-2, -7)$

$y + 7 = -1(x + 2)$

⑤ $f(x) = \begin{cases} x^2+3, & x < 2 \\ x^3+1, & x \geq 2 \end{cases}$

$\lim_{x \rightarrow 2^-} f(x) = (2)^2+3 = 7$ $\lim_{x \rightarrow 2^+} f(x) = 2^3+1 = 9$

$\lim_{x \rightarrow 2} f(x) = \text{DNE}$

⑥

x	-1	0	3	5	8
f(x)	5	2	4	9	6

RRAM $4(4)+5(6) = 46$

LRAM $4(5)+5(4) = 40$

MRAM $4(2)+5(9) = 53$

Trap $\frac{1}{2}(4)(5+4) + \frac{1}{2}(5)(4+6) = 43$

⑦

x	-1	0	3	5	8
f(x)	5	2	4	9	6

$f(x) = 6$ by IVT $f(3) = 4 < 6 < 9 = f(5)$
 $[3, 5]$

⑧ $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

$\lim_{h \rightarrow 0} \frac{2(-1+h)^2 - 2(-1)^2}{h}$

$f'(-1)$ where $f(x) = 2x^2$

⑨ $-\ln|3-y| = \sin(x) + C$ $y(0) = 1$ (0,1)

$-\ln|3-1| = \sin(0) + C$

$-\ln|2| = 0 + C$

$-\ln 2 = C$

$-\ln|3-y| = \sin(x) - \ln 2$

$\ln 2 - \ln|3-y| = \sin(x)$

$\ln \frac{2}{|3-y|} = \sin(x)$

$|3-y| e^{\sin(x)} = \frac{2}{|3-y|} \cdot |3-y|$

$\frac{|3-y| e^{\sin(x)}}{e^{\sin(x)}} = \frac{2}{e^{\sin(x)}}$

$|3-y| = \frac{2}{e^{\sin(x)}}$

$3-y = \pm \frac{2}{e^{\sin(x)}}$

$-y = -3 \pm \frac{2}{e^{\sin(x)}}$

$y = 3 \pm \frac{2}{e^{\sin(x)}}$

$y = 3 + \frac{2}{e^{\sin(x)}}$

$1 = 3 + \frac{2}{e^{\sin(0)}}$

$1 = 5$

$y = 3 - \frac{2}{e^{\sin(x)}}$

$1 = 3 - \frac{2}{e^{\sin(0)}}$

$1 = 1$

(0,1)

⑩ a) $\sin\left(\frac{\pi}{2}\right) = 1$

b) $\sec^2\left(\frac{2\pi}{3}\right) = (-2)^2 = 4$
 $\cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2}$

c) $\arcsin\left(-\frac{1}{2}\right) = \frac{x}{6} = -\frac{\pi}{6}$