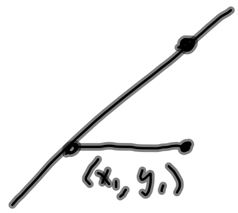
§1.2 # 9, 5b

§1.3 # 29d, 35c



1.2 #5b thru $(x,y)=(2,1)$

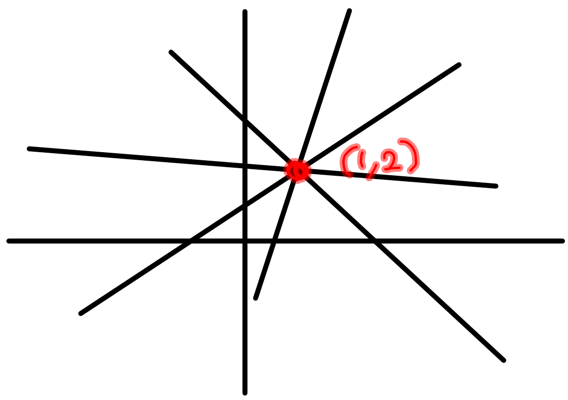
Find eq'n of family

Sketch several members

$y = m\underbrace{(x-x_0)} + y_1$

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

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



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1,2 #9

§1.2 # 9,

§1.3 # 29d, 35c

$f(x) = ax^3 + bx^2 + cx + d$

is cubic func.

$f(-1) = 0 = a(-1)^3 + b(-1)^2 + c(-1) \cancel{+d} = 0$

$f(0) = \boxed{0 = d}$

$f(2) = 0 = a(2)^3 + b(2)^2 + c(2) \quad = 0$

$f(1) = a + b + c = 6$

$$\boxed{\begin{aligned} a + b + c &= 6 \\ -a + b - c &= 0 \\ 8a + 4b + 2c &= 0 \end{aligned}}$$

Solve this system for c.

Another approach using factor theorem

$f(x) = ax(x-2)(x+1)$

$f(1) = 6 \Rightarrow a(1)(1-2)(1+1) = 6$

$\Rightarrow a(-1)(2) = 6$

$\Rightarrow -2a = 6$

$\Rightarrow a = -3$

$\Rightarrow f(x) = -3x(x-2)(x+1)$ is fine

EXPAND (OR DO IT w/o Factor Theorem)

$f(x) = (-3x^2 + 6x)(x+1)$

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

$= \boxed{-3x^3 + 3x^2 + 6x}$ is also fine.

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$$a + b + c = 6$$
$$-a + b - c = 0$$
$$8a + 4b + 2c = 0$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ -1 & 1 & -1 & 0 \\ 8 & 4 & 2 & 0 \end{array}\right]$$

$$\begin{array}{r} R1 \\ R1+R2 \\ -8R2+R3 \end{array} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 2 & 0 & 6 \\ 0 & -4 & -6 & -48 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & a \\ 0 & 1 & 0 & b \\ 0 & 0 & 1 & c \end{array}\right]$$

$$\tfrac{1}{2}R2 \left[\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 1 & 0 & 3 \\ 0 & -4 & -6 & -48 \end{array}\right]$$

$$\begin{array}{r} -R2+R1 \\ R2 \\ 4R2+R3 \end{array} \left[\begin{array}{ccc|c} 1 & 0 & 1 & 3 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & -6 & -36 \end{array}\right]$$

$$-\tfrac{1}{6}R3 \left[\begin{array}{ccc|c} 1 & 0 & 1 & 3 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 6 \end{array}\right]$$

$$\begin{array}{r} -R3+R1 \\ R2 \\ R3 \end{array} \left[\begin{array}{ccc|c} 1 & 0 & 0 & -3 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 6 \end{array}\right]$$

This last says

$$\boxed{\begin{aligned} a &= -3 \\ b &= 3 \\ c &= 6 \end{aligned}}$$

① $a + b + c = 6$

② $-a + b - c = 0 \Longrightarrow b = a + c$ is easiest/cleanest.

③ $8a + 4b + 2c = 0$

Send that to other 2 eq'ns.

A

① $a + (a+c) + c = 6 \Longrightarrow$ B $2a + 2c = 6 \Longrightarrow$

③ $8a + 4(a+c) + 2c = 0$ $\quad 8a + 4a + 4c + 2c = 0$

C

$2a + 2c = 6$

$12a + 6c = 0 \Longrightarrow$ D ① $a + c = 3 \Longrightarrow a = 3 - c$

② $2a + c = 0$

E

$\Longrightarrow$ ② $2(3-c) + c = 0$

$\Longrightarrow 6 - 2c + c = 0$

$\Longrightarrow 6 - c = 0$

$\Longrightarrow \boxed{6 = c}$

$\Longrightarrow$ D $a = 3 - c = 3 - 6 = \boxed{-3 = a}$

$\Longrightarrow$ Beginning $b = a + c = -3 + 6 = \boxed{3 = b}$

29 $f(x) = x^3 + 2x^2$ $g(x) = 3x^2 - 1$

d $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{x^3+2x^2}{3x^2-1}$

$\mathcal{D}\left(\frac{f}{g}\right) = \{x \mid x \in \underbrace{\mathcal{D}(f)}_{\mathbb{R}} \text{ and } \underbrace{\mathcal{D}(g)}_{\mathbb{R}} \text{ and } g(x) \neq 0\}$

$\mathbb{R} \cap \mathbb{R} \cap \{x \mid g(x) \neq 0\}$

$= \{x \mid g(x) \neq 0\} = \{x \mid x \neq \pm\sqrt{\frac{1}{3}}\}$

Solve $g(x) = 3x^2 - 1 = 0$

$3x^2 = 1$

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

$x = \pm\sqrt{\frac{1}{3}}$

$= (-\infty, -\frac{\sqrt{3}}{3}) \cup (-\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}) \cup (\frac{\sqrt{3}}{3}, \infty)$