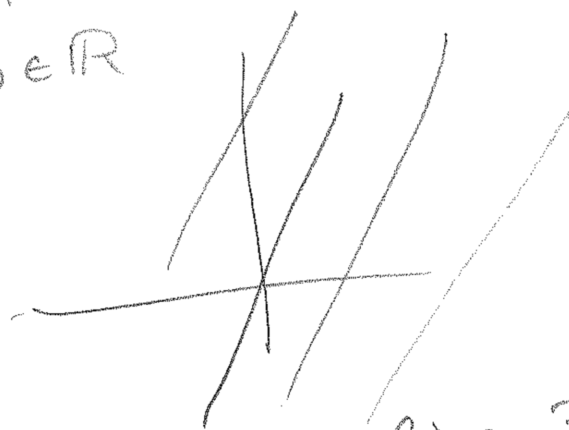
§ 1,2

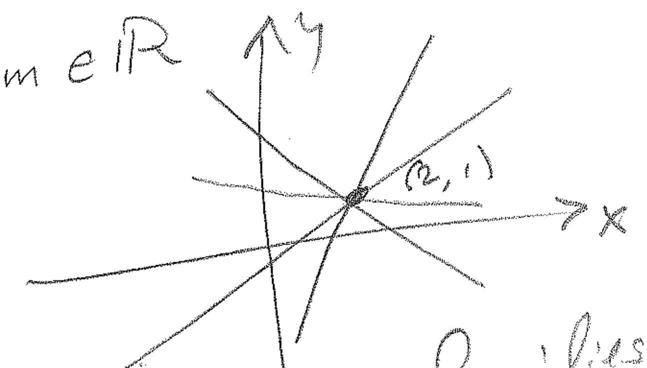
1a) Eq'n for family of linear function with slope $m=2$ & sketch some

$y = 2x + b, \; b \in \mathbb{R}$



1b) Eq'n for family of lines $\ni f(2)=1$ & sketch some

$y = m(x-2)+1, \; m \in \mathbb{R}$

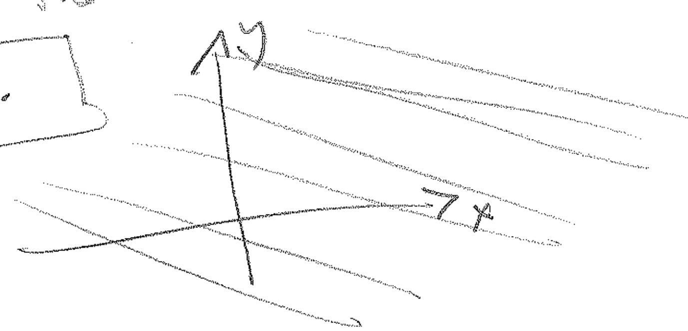


1c) $f(x) = 2(x-2)+1$ is in both families

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

2) All members of the $f(x) = a - x$ families have slope $m = -1$.

Sketch some.



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3 in class. Find a cubic func ∋ $f(1)=6$ and

$f(-1) = f(0) = f(2) = 0$

M1 Cubic: $f(x) = ax^3 + bx^2 + cx + d$

Method 1: Brute Force. I suggest you look at Method 2, as well, because it's so slick. But this 1st method shows how one might methodically use the points given to derive a system of linear equations and solve for the coefficients of the cubic function in question.

$f(1) = 6 \Longrightarrow$

$a(1)^3 + b(1)^2 + c(1) + d = 6$, i.e.,

E1 $a + b + c + d = 6$

$f(-1) = 0 \Longrightarrow$

$a(-1)^3 + b(-1)^2 + c(-1) + d = 0 \Longrightarrow$

E2 $-a + b - c + d = 0$

$f(0) = 0 \Longrightarrow$

$a(0)^3 + b(0)^2 + c(0) + d = 0 \Longrightarrow$

$d = 0$ means we can drop d, in all the eq'ns.

$f(2) = 0 \Longrightarrow$

$a(2)^3 + b(2)^2 + c(2) + d = 0 \Longrightarrow$

E3 $8a + 4b + 2c + d = 0$

Now drop d & get rolling:

(Back-Sub @ end.)

E1 $a + b + c = 6$

E2 $-a + b - c = 0 \longrightarrow \boxed{b = a + c}$ Send this to E1 & E3:

E3 $8a + 4b + 2c = 0$

E1: $a + (a+c) + c = 6 \longrightarrow$ E4 $2a + 2c = 6$

E3: $8a + 4(a+c) + 2c = 0 \longrightarrow$

$8a + 4a + 4c + 2c = 12a + 6c = 0$ E5

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(3) cont'd. NEW 2x2 system:

E4 $2a+2c=6$ $\longrightarrow$ E4 $a+c=3$ $\Longrightarrow$ $\boxed{a=3-c \text{ Send to E5}}$

E5 $12a+6c=0$ $\longrightarrow$ E5 $2a+c=0$

use for back-sub.

E5: $2a+c=0$ is now

$2(3-c)+c=0 \longrightarrow$

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

$-c=-6 \longrightarrow$

$\boxed{c=+6}$

Back-Sub: $a=3-c=3-6=\boxed{-3=a}$

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

So, $\boxed{f(x)=-3x^3+3x^2+6x}$

M2 Use the zeros to write factors

Method 2: Since data points corresponded to zeros of the function, we can immediately write the durn thing in factored form. The only coefficient we need to worry about is the leading coefficient.

$f(-1)=f(0)=f(2)=0 \longrightarrow$

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

Now, $f(1)=6$ gives

$f(1)=a(2)(1)(-1)=6 \longrightarrow$

$-2a=6 \longrightarrow$

$a=-3 \longrightarrow \boxed{f(x)=-3x(x+1)(x-2)}$

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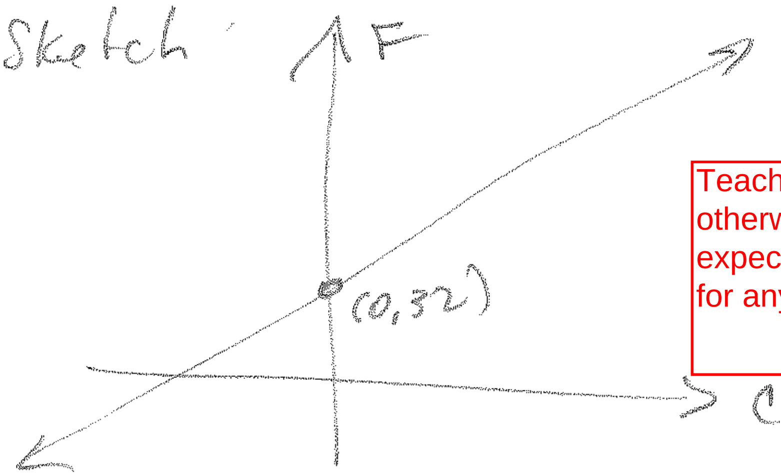
3 cont'd.
I liked Amber's elimination method and I showed you the matrix (Gauss-Jordan) method in class

4 Fahrenheit & Celsius are related by the linear function $F = \frac{9}{5}C + 32$

(a) Sketch



Teacher got lazy! Unless otherwise specified, I generally expect (and provide) *x*-intercept for any line that has one.

(b) Slope of graph is $\frac{9}{5}$. It means Fahrenheit temp increases by $\frac{9}{5}$ degrees whenever Celsius increases by 1 degree.
The F-intercept is $(0, 32)$ and it corresponds to $0°C = 32°F$.

I don't like the way I wrote this last bit, at *all*. 0^{o} C does *not* "equal" 32^{o} F. They *correspond* to one another via the conversion formula given. To say they're equal is like saying a dog *is* 2 cups of food because that's what he is fed. He's not 2 cups of food, but 2 cups of food goes to/with that dog.