Lecture: 03/25 Lecture on abs. values and sets.

Announcements: hw12_Glaser1
hw12_Glaser2

Extra credit 10 points added to homework due today at 3:30
a) name you homework correctly
b) submitted as a .pdf file.

Pictures in .jpg format.

Main issue on hwk was not explaining when there is equality in inequalities.

2 b) Used Cauchy ineq to show that

$$\sqrt{\frac{a+b}{a+b+c}}\cdot 1+\sqrt{\frac{a+c}{a+b+c}}\cdot 1+\sqrt{\frac{b+c}{a+b+c}}\cdot 1\leq\sqrt{6}$$

$$\vec{A}\cdot\vec{B}\leq\|\vec{A}\|\cdot\|\vec{B}\|$$

Equality when $\vec{A}=k\vec{B}$ $k\geq 0$.

$$\sqrt{\frac{a+b}{a+b+c}}=k\cdot 1,\ \sqrt{\frac{a+c}{\ldots}}=k\cdot 1,\ \sqrt{\frac{b+c}{a+b+c}}=k\cdot 1$$

$$\Longleftrightarrow\sqrt{\frac{a+b}{\ldots}}=\sqrt{\frac{a+c}{\ldots}}=\sqrt{\frac{b+c}{\ldots}}=k$$

$a+b = a+c = b+c \iff \boxed{a=b=c}$

#4a) $\frac{z}{y} + \frac{8x}{z} + \frac{27y}{x} \geq 18$ (=)

$\frac{a+b+c}{3} \geq \sqrt[3]{abc}$ (=) (Arith - Geom ineq).

Equality $\boxed{\frac{z}{y} = \frac{8x}{z} = \frac{27y}{x} = 6}$

Express y and z in terms of x

$8x = 6z$, $z = \frac{4}{3}x$, $y = \ldots$

#3. $\sqrt{\frac{a^2+b^2}{2}} \leq \max\{a, b\}$

Assume $a \leq b$ (if $b > a$, rename b as a and a as b)

$\sqrt{\frac{a^2+b^2}{2}} \leq b$

Redo by Friday

hw11_LastName_redo

Ex 2 b) $|x| - 2|x+3| = 2x$

Case 1 $x \geq 0$: $x - 2(x+3) = 2x$,

$x - 2x - 6 = 2x$

~~$x = -2$~~

Case 2: $x < 0$ $-x - 2|x+3| = 2x$

$$-2|x+3| = 3x$$

$$|x+3| = -\tfrac{3}{2}x$$

↙ ↘

Prop. 4. 3) $(|x+y|)^2 \leq (|x|+|y|)^2$

$$2xy \leq 2|xy|$$

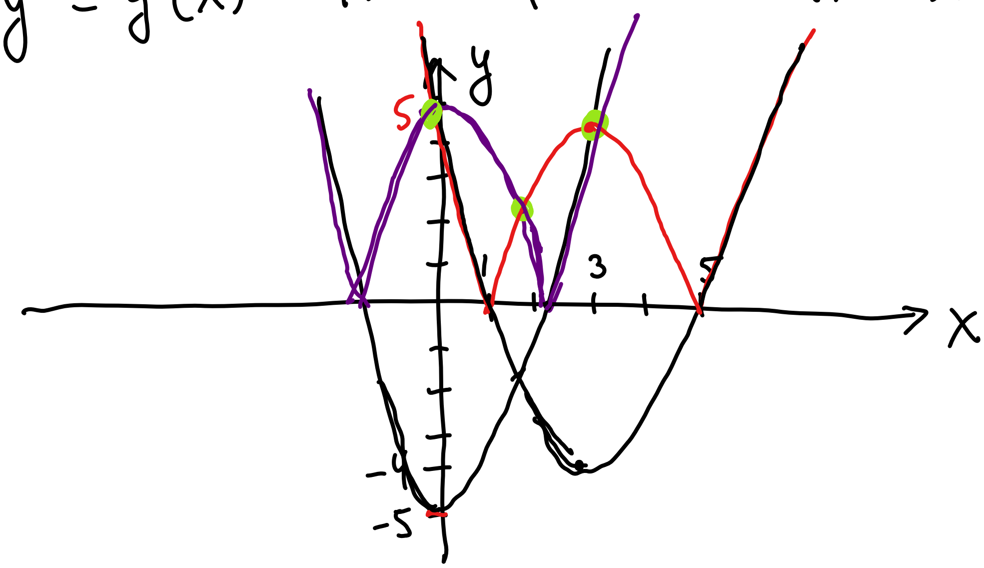
Example: Graphically decide how many solution we have for the equation

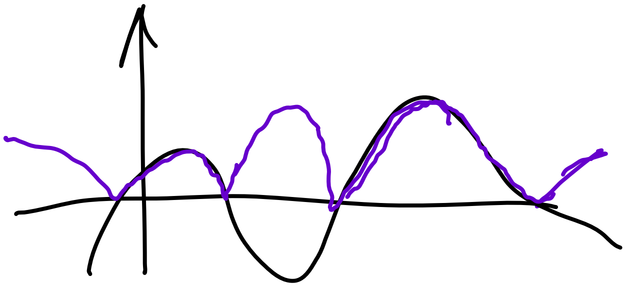
$$|x^2-6x+5| = |x^2-5|$$

$$y = f(x) = |x^2-6x+5|$$

$$y = g(x) = |x^2-5|$$

$$y = x^2-6x+5 = (x-5)(x-1)$$

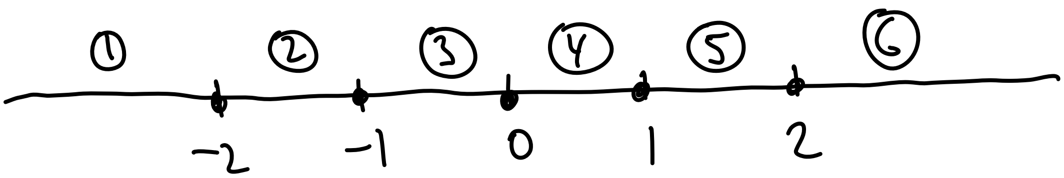




$|f(x)| = ?$

Exercise 6. Solve

$$|x-2| + |x-1| + |x| + |x+1| + |x+2| = 6$$



1) $x < -2$ $\quad -(x-2)-(x-1)-x-(x+1)-(x+2)=6$

$-5x = 6$, $x = -6/5$