JANUARY 23

Evaluate the following for $f(x)=\begin{cases}-2|x+1|, & x\le 1\\ 3, & 1<x<3\\ 6-2x, & x\ge 3\end{cases}$:

f(10)

$=6-2(10)$

$=-14$

$f(2)=3$

f(0)

$-2|0+1|=$

$-2(1)=$

-2

$f(3)=\text{DNE}$

$f(x)=\{-x^2 \;,\; x\ge \_\_$

$-(-5)^2=-(25)=-25$

$-(-5)(-5)$

$$f(x)=\begin{cases}\sqrt{x}+3 & \text{for } 0\le x\le 1\\ ax^2-b & \text{for } 1<x<4\\ \frac{x}{2}-3 & x\ge 4\end{cases}$$

Find a and b so that f(x) is continuous

$\sqrt{x}+3=ax^2-b$ (when $x=1$)

$\sqrt{1}+3=a(1)^2-b$

$\boxed{4=a-b}$

$ax^2-b=\frac{x}{2}-3$ (when $x=4$)

$a(4)^2-b=\frac{4}{2}-3$

$\boxed{16a-b=-1}$

Elimination

$16a-b=-1$

$-(a-b=4)$

$\frac{15a}{15}=\frac{-5}{15}$

$a=-\frac{1}{3}$

$-\frac{1}{3}-b=4$

$-b=4\frac{1}{3}=\frac{13}{3}=4.333$

$b=-\frac{13}{3}$

Substitution

$a-b=4$

$a=4+b$

$16(4+b)-b=-1$

$64+16b-b=-1$

$\frac{15b}{15}=\frac{-65}{15}$

$b=\frac{-65}{15}=\frac{-13}{3}$

$$f(x)=\begin{cases}\sqrt{x}+3 & \text{for } 0\le x\le 1\\ ax^2-b & \text{for } 1<x<4\\ \frac{x}{2}-3 & x\ge 4\end{cases}$$

Find a and b so that f(x) is continuous

$\sqrt{x}+3=ax^2-b$ (when $x=1$)

$\sqrt{1}+3=a(1)^2-b$

$\boxed{4=a-b}$

$\frac{x}{2}-3=ax^2-b$ (when $x=4$)

$\frac{4}{2}-3=a(4)^2-b$

$\boxed{-1=16a-b}$

$-1=16a-b$

$-(4=a-b)$

$\frac{-5}{15}=\frac{15a}{15}$

$-\frac{1}{3}=a$

$4=-\frac{1}{3}-b$

$4\frac{1}{3}=4.333=\frac{13}{3}=-b$

$b=-\frac{13}{3}$

$4=a-b$ | $-1=16a-b$

$-a \quad -a$ | $-16a \quad -16a$

$4-a=-b$ | $-1-16a=-b$

$-4+a=b$ | $1+16a=b$

$-4+a=1+16a$

$-1\ -a \quad -1\ -a$

$\frac{-5}{15}=\frac{15a}{15}$

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$ax^2-b=\frac{x}{2}-3$ (when $x=4$)

$a(4)^2-b=\frac{4}{2}-3$

$\boxed{16a-b=-1}$

$4=a-b$

$-(-1=16a-b)$

$5=-15a$

$\frac{5}{-15}=\frac{-15a}{-15}$

$-\frac{1}{3}=a$

$4=-\frac{1}{3}-b$

$+\frac{1}{3}\quad+\frac{1}{3}$

$4\frac{1}{3}=-b \rightarrow b=-4\frac{1}{3}$

-4.333

$-\frac{13}{3}$

$4=a-b$

$4+b=a$

$-1=16a-b$

$-1=16(4+b)-b$

$-1=64+16b-b$

$-65=15b$

$\frac{-65}{15}=\frac{15b}{15}$

$\frac{-65}{15}=\frac{-13}{3}=b$