Problem 1

$$\frac{3\cdot x+7}{6\cdot x}+\frac{x-6}{7}=\frac{3\cdot x+7}{6\cdot x}\cdot\frac{7}{7}+\frac{x-6}{7}\cdot\frac{6x}{6x}$$

$$=\frac{21\cdot x+49}{6\cdot x\cdot 7}+\frac{6\cdot x^2-36\cdot x}{6\cdot x\cdot 7}$$

$$=\frac{21\cdot x+49+6\cdot x^2-36\cdot x}{6\cdot x\cdot 7}$$

$$=\frac{6\cdot x^2-15\cdot x+49}{42\cdot x}$$

8/15 completely simplified correctly

Related work

$(3\cdot x+7)\cdot 7=21\cdot x+49$

$(6x)\cdot(x-6)=6\cdot x^2-36\cdot x$

$21\cdot x+49+6\cdot x^2-36\cdot x = 6\cdot x^2-15\cdot x+49$

$6\cdot x^2-15\cdot x+49$

Quick checks of completely factored

D=$(-15)^2-4\cdot 6\cdot 49 \blacktriangleright -951$

This means that $6\cdot x^2-15\cdot x+49$ is NOT factorable

(this also means then function $f(x)=\dfrac{6\cdot x^2-15\cdot x+49}{42\cdot x}$

does not have any x intercepts because D < 0)

since no single factor of 42 $=2\cdot 3\cdot 7$ is a common factor of each term and since all terms are not divisible by x, this is completely simplified

Problem 2

$$\frac{5\cdot x^2+1\cdot x}{3\cdot x}+\frac{x^2-2\cdot x}{x-4}$$

This problem has a fraction that can be simplified first

$$=\frac{5\cdot x+1}{3}+\frac{x^2-2\cdot x}{x-4}$$

$$=\frac{5\cdot x+1}{3}\cdot\frac{x-4}{x-4}+\frac{x^2-2\cdot x}{x-4}\cdot\frac{3}{3}$$

$$=\frac{5\cdot x^2-19\cdot x-4}{3\cdot (x-4)}+\frac{3\cdot x^2-6\cdot x}{3\cdot (x-4)}$$

$$=\frac{8\cdot x^2-25\cdot x-4}{3\cdot (x-4)}$$

4/15 completely simplified correctly

Related work

$(5\cdot x+1)\cdot (x-4)=5\cdot x^2-19\cdot x-4$

$(x^2-2\cdot x)\cdot 3=3\cdot x^2-6\cdot x$

$5\cdot x^2-19\cdot x-4+3\cdot x^2-6\cdot x = 8\cdot x^2-25\cdot x-4$

$8\cdot x^2-25\cdot x-4$

Quick checks of completely factored

D = $(^-25)^2-4\cdot 8\cdot {}^-4 \blacktriangleright 753$ means $8\cdot x^2-25\cdot x-4$ is NOT factorable

$8\cdot 4^2-25\cdot 4-4$ also means that x−4 is NOT a factor of $8\cdot x^2-25\cdot x-4$

since all terms are not divisible by 3 this is completely simplified

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Problem 3

$$\frac{2\cdot x+5}{4\cdot x^3}-\frac{3x-2}{5}=\frac{2\cdot x+5}{4\cdot x^3}+\frac{-(3x-2)}{5}$$

$$=\frac{2\cdot x+5}{4\cdot x^3}+\frac{-3x+2}{5}$$

$$=\frac{2\cdot x+5}{4\cdot x^3}\cdot\frac{5}{5}+\frac{-3x+2}{5}\cdot\frac{4x^3}{4x^3}$$

$$=\frac{10\cdot x+25}{5\cdot 4\cdot x^3}+\frac{8\cdot x^3-12\cdot x^4}{5\cdot 4\cdot x^3}$$

$$=\frac{10\cdot x+25+8\cdot x^3-12\cdot x^4}{5\cdot 4\cdot x^3}$$

$$=\frac{^-12\cdot x^4+8\cdot x^3+10\cdot x+25}{20\cdot x^3}$$

5/15 completely simplified correctly

Related Work

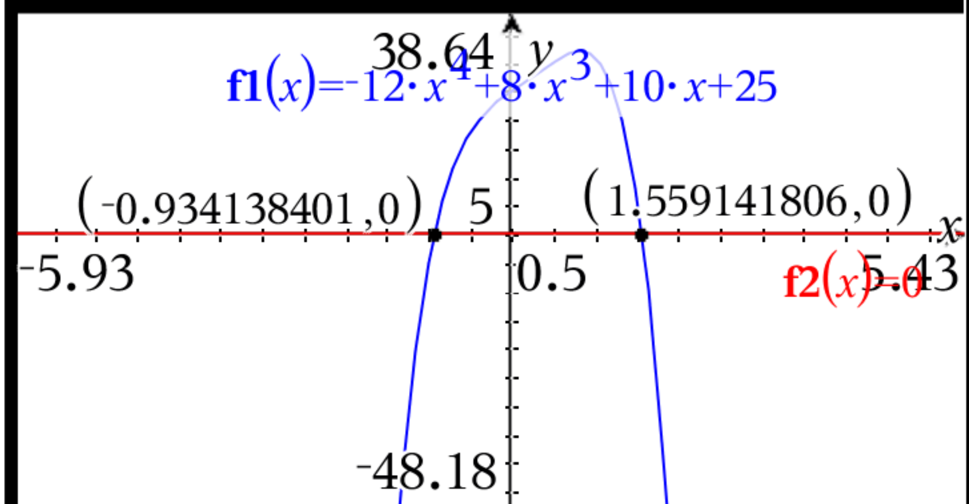
$(2\cdot x+5)\cdot 5=10\cdot x+25$

$(-3x+2)\cdot(4x^3)=8\cdot x^3-12\cdot x^4$

$10\cdot x+25+8\cdot x^3-12\cdot x^4={}^-12\cdot x^4+8\cdot x^3+10\cdot x+25$

since no single factor of $20=2^2\cdot 5$ is a factor of all terms and since all terms do not contain an x, this is completely simplified

roots of $^-12\cdot x^4+8\cdot x^3+10\cdot x+25$ are IRRATIONAL or IMAGINARY also means that this is simplified (see below)



Problem 4

$$\frac{x^2+6\cdot x}{3\cdot x+2}-\frac{2x^2-3\cdot x}{5x}$$

This problem has a fraction that can be simplified first

$$\frac{x^2+6\cdot x}{3\cdot x+2}-\frac{2\cdot x-3}{5}$$

$$=\frac{x^2+6\cdot x}{3\cdot x+2}+\frac{-1(2\cdot x-3)}{5}$$

$$=\frac{x^2+6\cdot x}{3\cdot x+2}+\frac{-2\cdot x+3}{5}$$

$$=\frac{x^2+6\cdot x}{3\cdot x+2}\cdot\frac{5}{5}+\frac{-2x+3}{5}\cdot\frac{3x+2}{3x+2}$$

$$=\frac{5\cdot x^2+30\cdot x}{5\cdot(3x+2)}+\frac{^-6\cdot x^2+5\cdot x+6}{5\cdot(3x+2)}$$

$$=\frac{5\cdot x^2+30\cdot x+^-6\cdot x^2+5\cdot x+6}{5\cdot(3\cdot x+2)}=\frac{-1x^2+35\cdot x+6}{5\cdot(3x+2)}$$

3/15 completely simplified correctly

Related work

$(x^2+6\cdot x)\cdot 5=5\cdot x^2+30\cdot x$

$(-2x+3)\cdot(3x+2)={}^-6\cdot x^2+5\cdot x+6$

$5\cdot x^2+30\cdot x+{}^-6\cdot x^2+5\cdot x+6={}^-x^2+35\cdot x+6$

${}^-x^2+35\cdot x+6$

D $=35^2-4\cdot{}^-1\cdot 6 \blacktriangleright 1249$

This means that ${}^-x^2+35\cdot x+6$ cannot be factored

OR

${}^-\left(\frac{^-2}{3}\right)^2+35\cdot\frac{^-2}{3}+6 \blacktriangleright \frac{^-160}{9}$ this means that $x=\frac{-2}{3}$ is not a root of ${}^-x^2+35\cdot x+6$

and since all terms are not divisible by 5, this is completely simplified

Problem 5

$$\frac{3\cdot x+4}{2\cdot x-3}+\frac{x-2}{x+1}$$

$$=\frac{3\cdot x+4}{2\cdot x-3}\cdot\frac{x+1}{x+1}+\frac{x-2}{x+1}\cdot\frac{2x-3}{2x-3}$$

$$=\frac{3\cdot x^{2}+7\cdot x+4}{(2x-3)(x+1)}+\frac{2\cdot x^{2}-7\cdot x+6}{(2x-3)(x+1)}$$

$$=\frac{3\cdot x^{2}+7\cdot x+4+2\cdot x^{2}-7\cdot x+6}{(2x-3)(x+1)}$$

$$=\frac{5\cdot x^{2}+10}{(2\cdot x-3)\cdot(x+1)}=\frac{5\cdot\left(x^{2}+2\right)}{(x+1)\cdot(2\cdot x-3)}$$

7/15 completely simplified correctly

Related work

$$(3\cdot x+4)\cdot(x+1)=3\cdot x^{2}+7\cdot x+4$$

$$(2x-3)\cdot(x-2)=2\cdot x^{2}-7\cdot x+6$$

$$3\cdot x^{2}+7\cdot x+4+2\cdot x^{2}-7\cdot x+6=5\cdot x^{2}+10$$

since none of the binomials are equal or multiples of each other this is completely simplified

Problem 6

$$\frac{x^2+6x}{x+4}+\frac{x^2-3x}{x-5}$$

$$=\frac{x^2+6x}{x+4}\cdot\frac{x-5}{x-5}+\frac{x^2-3x}{x-5}\cdot\frac{x+4}{x+4}$$

$$=\frac{x^3+x^2-30\cdot x}{(x+4)(x-5)}+\frac{x^3+x^2-12\cdot x}{(x+4)(x-5)}$$

$$=\frac{x^3+x^2-30\cdot x+x^3+x^2-12\cdot x}{(x+4)(x-5)}$$

$$=\frac{2\cdot x^3+2\cdot x^2-42\cdot x}{(x+4)(x-5)}=\frac{2\cdot x\cdot\left(x^2+x-21\right)}{(x-5)\cdot(x+4)}$$

7/15 completely simplified correctly

Related work

$$\left(x^2+6\cdot x\right)\cdot(x-5)=x^3+x^2-30\cdot x$$

$$\left(x^2-3x\right)\cdot(x+4)=x^3+x^2-12\cdot x$$

$$x^3+x^2-30\cdot x+x^3+x^2-12\cdot x$$

$$=2\cdot x^3+2\cdot x^2-42\cdot x$$

since none of the polynomials are equal or multiples of each other this is completely simplified

$$x^2+x-21$$

$$D=1^2-4\cdot 1\cdot {}^{-}21 \quad \blacktriangleright\ 85$$

This means that x^2+x-21 is not factorable and therefore neither $(x+4)$ nor $(x-5)$ are factors of the numerator

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Problem 7

$$\frac{5x+2}{3\cdot x^3+4x}-\frac{3x-1}{x-5}=\frac{5x+2}{3\cdot x^3+4x}+\frac{-(3x-1)}{x-5}$$

$$=\frac{5\cdot x+2}{3\cdot x^3+4x}+\frac{-3x+1}{x-5}$$

$$=\frac{5\cdot x+2}{3\cdot x^3+4x}\cdot\frac{x-5}{x-5}+\frac{-3x+1}{x-5}\cdot\frac{3x^3+4x}{3x^3+4x}$$

$$=\frac{5\cdot x^2-23\cdot x-10}{(3\cdot x^3+4x)(x-5)}+\frac{-9\cdot x^4+3\cdot x^3-12\cdot x^2+4\cdot x}{(3\cdot x^3+4x)(x-5)}$$

$$=\frac{5\cdot x^2-23\cdot x-10+-9\cdot x^4+3\cdot x^3-12\cdot x^2+4\cdot x}{(3\cdot x^3+4x)(x-5)}$$

$$=\frac{-9\cdot x^4+3\cdot x^3-7\cdot x^2-19\cdot x-10}{(3\cdot x^3+4\cdot x)\cdot(x-5)}$$

5/15 completely simplified correctly

Related Work

$(5\cdot x+2)\cdot(x-5)=5\cdot x^2-23\cdot x-10$

$(-3x+1)\cdot(3x^3+4x)=-9\cdot x^4+3\cdot x^3-12\cdot x^2+4\cdot x$

$5\cdot x^2-23\cdot x-10+-9\cdot x^4+3\cdot x^3-12\cdot x^2+4\cdot x$

$=-9\cdot x^4+3\cdot x^3-7\cdot x^2-19\cdot x-10$

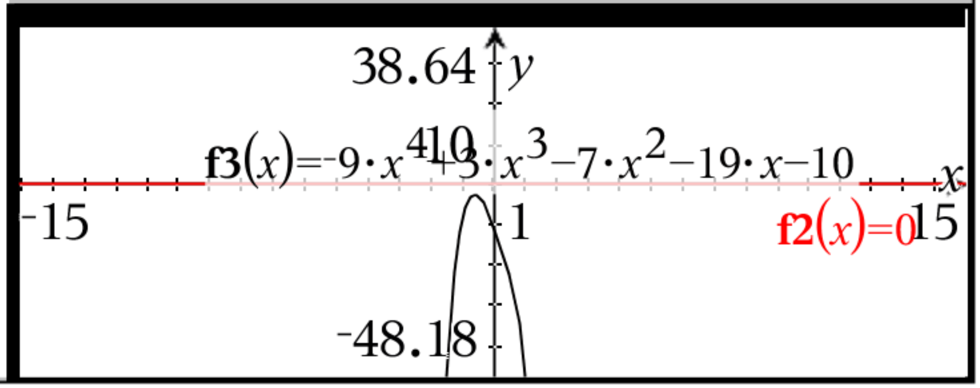
$(3\cdot x^3+4\cdot x)\cdot(x-5)=3\cdot x^4-15\cdot x^3+4\cdot x^2-20\cdot x$

$(3\cdot x^3+4\cdot x)\cdot(x-5)=x\cdot(x-5)\cdot(3\cdot x^2+4)$

roots of $-9\cdot x^4+3\cdot x^3-7\cdot x^2-19\cdot x-10$ are IMAGINARY also means that this is simplified (see below)

$-9\cdot 5^4+3\cdot 5^3-7\cdot 5^2-19\cdot 5-10 \blacktriangleright -5530$

also means that x = 5 is NOT a root of numerator



Problem 8 $\frac{x^2-6\cdot x}{2\cdot x+3}-\frac{6x^2-8\cdot x}{2x^2+6x}$

This problem has a fraction that can be simplified first

$$\frac{x^2-6\cdot x}{2\cdot x+3}-\frac{3\cdot x-4}{x+3}$$

$$=\frac{x^2-6\cdot x}{2\cdot x+3}+\frac{-1(3\cdot x-4)}{x+3}$$

$$=\frac{x^2-6\cdot x}{2\cdot x+3}+\frac{-3\cdot x+4}{x+3}$$

$$=\frac{x^2-6\cdot x}{2\cdot x+3}\cdot\frac{x+3}{x+3}+\frac{-3x+4}{x+3}\cdot\frac{2x+3}{2x+3}$$

$$=\frac{x^3-3\cdot x^2-18\cdot x}{(2x+3)(x+3)}+\frac{{}^-6\cdot x^2-x+12}{(2x+3)(x+3)}$$

$$=\frac{x^3-3\cdot x^2-18\cdot x+{}^-6\cdot x^2-x+12}{(2x+3)(x+3)}=\frac{x^3-9\cdot x^2-19\cdot x+12}{(2x+3)(x+3)}$$

1/15 completely simplified correctly

Related work

$(x^2-6\cdot x)\cdot(x+3)=x^3-3\cdot x^2-18\cdot x$

$(-3x+4)\cdot(2x+3)={}^-6\cdot x^2-x+12$

$x^3-3\cdot x^2-18\cdot x+{}^-6\cdot x^2-x+12=x^3-9\cdot x^2-19\cdot x+12$

$(2\cdot x+3)\cdot(x+3)=2\cdot x^2+9\cdot x+9$

$x^3-9\cdot x^2-19\cdot x+12$ cannot be factored

OR

$({}^-3)^3-9\cdot({}^-3)^2-19\cdot{}^-3+12 \blacktriangleright {}^-39$

this means that x $=-3$ is not a root of $x^3-9\cdot x^2-19\cdot x+12$

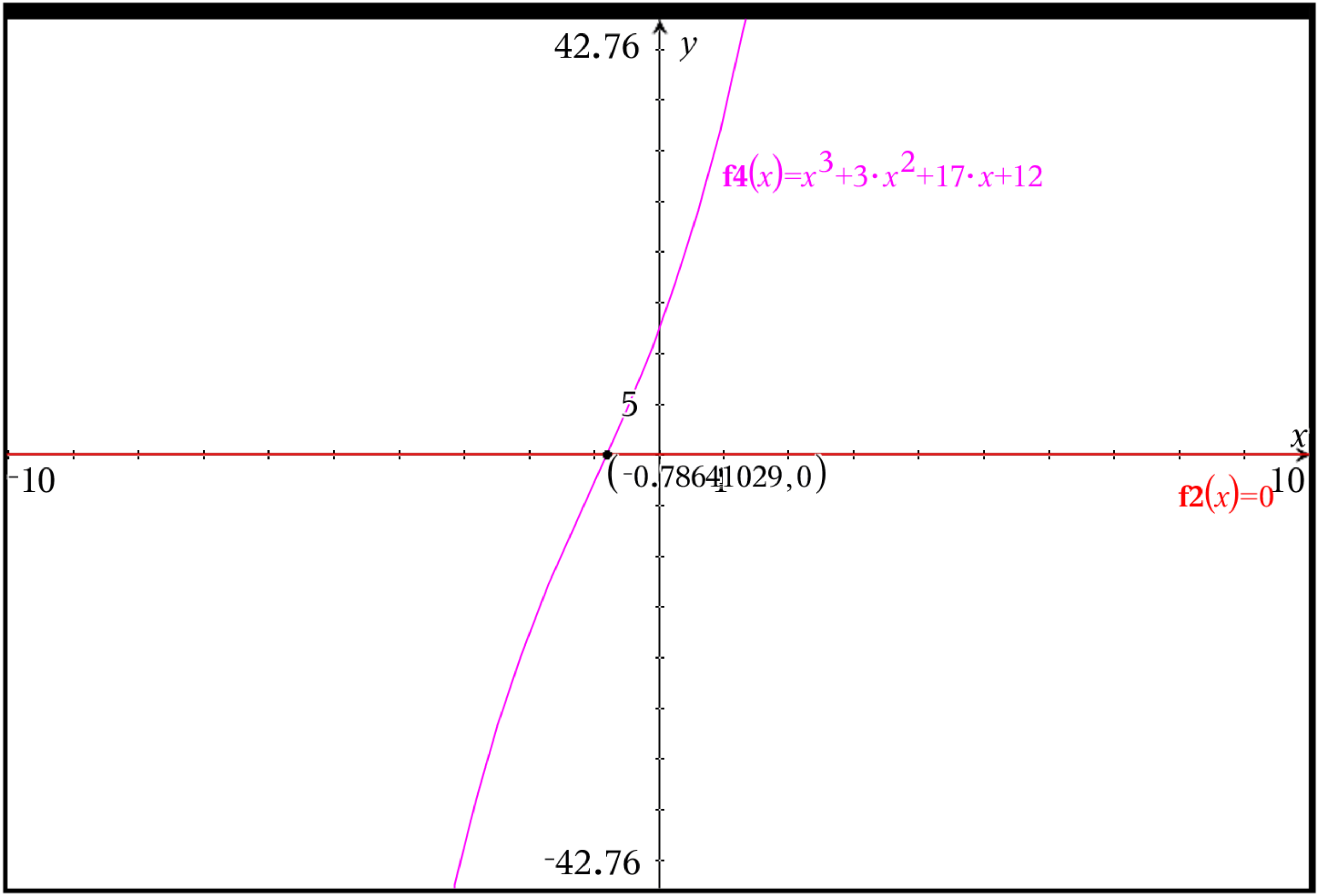
and (x+3) is not a factor of $x^3-9\cdot x^2-19\cdot x+12$

OR

$\left(\frac{{}^-3}{2}\right)^3-9\cdot\left(\frac{{}^-3}{2}\right)^2-\frac{19\cdot{}^-3}{2}+12 \blacktriangleright \frac{135}{8}$

this means that x $=\frac{{}^-3}{2}$ is not a root of $x^3-9\cdot x^2-19\cdot x+12$

and $(2x+3)$ is not a factor of $x^3-9\cdot x^2-19\cdot x+12$


42.76
y
$f4(x)=x^3+3\cdot x^2+17\cdot x+12$
5
x
-10
(-0.78641029,0)
1
$f2(x)=0$
10
-42.76