Problem 1

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

$$=\frac{6\cdot x+12}{5\cdot x\cdot 3}+\frac{5\cdot x^{2}-25\cdot x}{5\cdot x\cdot 3}$$

$$=\frac{6\cdot x+12+5\cdot x^{2}-25\cdot x}{5\cdot x\cdot 3}$$

$$=\frac{5\cdot x^{2}-19\cdot x+12}{15\cdot x}$$

$$=\frac{(x-3)\cdot(5\cdot x-4)}{15\cdot x}$$

14/21 completely simplified correctly

Related work

$(2\cdot x+4)\cdot 3 = 6\cdot x+12$

$(5x)\cdot(x-5) = 5\cdot x^{2}-25\cdot x$

$6\cdot x+12+5\cdot x^{2}-25\cdot x = 5\cdot x^{2}-19\cdot x+12$

$5\cdot x^{2}-19\cdot x+12$

Quick checks of completely factored

D=$(^-19)^{2}-4\cdot 5\cdot 12. \blacktriangleright 121 \quad \sqrt{121} \blacktriangleright 11$

This means that $5\cdot x^{2}-19\cdot x+12$ IS factorable

$5\cdot x^{2}-19\cdot x+12 = (x-3)\cdot(5\cdot x-4)$

since no single factor of 15 $=3\cdot 5$ is a common factor of each term and since all terms are not divisible by x, this is completely simplified

Problem 2

$$\frac{3\cdot x^2+4\cdot x}{2\cdot x}+\frac{x^2-5\cdot x}{x-7}$$

This problem has a fraction that can be simplified first

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

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

$$=\frac{3\cdot x^2-17\cdot x-28}{2\cdot(x-7)}+\frac{2\cdot x^2-10\cdot x}{2\cdot(x-7)}$$

$$=\frac{5\cdot x^2-27\cdot x-28}{2\cdot(x-7)}$$

6/21 completely simplified correctly

Related work

$(3\cdot x+4)\cdot(x-7)=\text{expand}((3\cdot x+4)\cdot(x-7)) ▸ 3\cdot x^2-17\cdot x-28$

$(x^2-5\cdot x)\cdot 2=\text{expand}((x^2-5\cdot x)\cdot 2) ▸ 2\cdot x^2-10\cdot x$

$3\cdot x^2-17\cdot x-28+2\cdot x^2-10\cdot x = 5\cdot x^2-27\cdot x-28$

$5\cdot x^2-27\cdot x-28$

Quick checks of completely factored

D = $(^-27)^2-4\cdot 5\cdot {}^-28 ▸ 1289$ this means that $5\cdot x^2-27\cdot x-28$ is NOT factorable

$5\cdot 7^2-27\cdot 7-28 ▸ 28$ also means that x−7 is NOT a factor of $5\cdot x^2-27\cdot x-28$

since all terms are not divisible by any of the factors of 2 this is completely simplified

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Problem 3

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

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

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

$$=\frac{21\cdot x+28}{7\cdot 5\cdot x^3}+\frac{25\cdot x^3-10\cdot x^4}{7\cdot 5\cdot x^3}$$

$$=\frac{21\cdot x+28+25\cdot x^3-10\cdot x^4}{7\cdot 5\cdot x^3}$$

$$=\frac{^-10\cdot x^4+25\cdot x^3+21\cdot x+28}{35\cdot x^3}$$

14/21 completely simplified correctly

Related Work

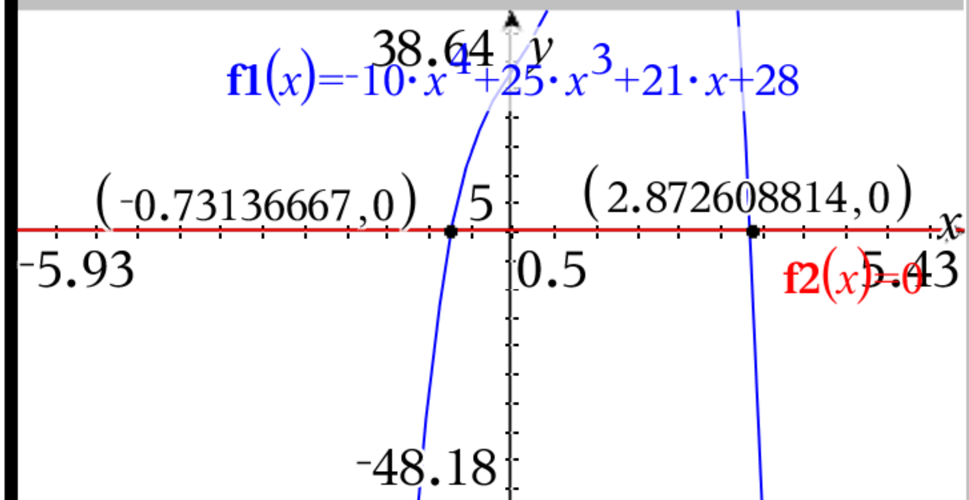
$(3\cdot x+4)\cdot 7=21\cdot x+28$

$(-2x+5)\cdot(5x^3)=25\cdot x^3-10\cdot x^4$

$21\cdot x+28+25\cdot x^3-10\cdot x^4={}^-10\cdot x^4+25\cdot x^3+21\cdot x+28$

since no single factor of $35=5\cdot 7$ is a factor of all terms and since all terms do not contain an x, this is completely simplified

roots of $^-10\cdot x^4+25\cdot x^3+21\cdot x+28$ are IRRATIONAL or IMAGINARY also means that this is simplified (see below)



Problem 4 $\dfrac{x^2+4\cdot x}{5\cdot x+2}-\dfrac{3x^2-5\cdot x}{3x}$

This problem has a fraction that can be simplified first

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

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

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

$$=\frac{3\cdot x^2+12\cdot x}{3\cdot(5x+2)}+\frac{^-15\cdot x^2+19\cdot x+10}{3\cdot(5x+2)}$$

$$=\frac{3\cdot x^2+12\cdot x+^-15\cdot x^2+19\cdot x+10}{3\cdot(5\cdot x+2)}$$

$$=\frac{^-12\cdot x^2+31\cdot x+10}{3\cdot(5\cdot x+2)}$$

5/21 completely simplified correctly

Related work

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

$(-3x+5)\cdot(5x+2)=^-15\cdot x^2+19\cdot x+10$

$3\cdot x^2+12\cdot x+^-15\cdot x^2+19\cdot x+10=^-12\cdot x^2+31\cdot x+10$

$^-12\cdot x^2+31\cdot x+10$

D $=31^2-4\cdot{}^-12\cdot 10 \blacktriangleright 1441$

This means that $^-12\cdot x^2+31\cdot x+10$

OR

$^-12\cdot\left(\frac{^-2}{5}\right)^2+31\cdot\frac{^-2}{5}+10 \blacktriangleright \frac{^-108}{25}$ this means that x $=\frac{-2}{5}$ is not a root of $^-12\cdot x^2+31\cdot x+10$

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

Problem 5 $\dfrac{2\cdot x+3}{5\cdot x-1}+\dfrac{x-1}{x+2}$

$=\dfrac{2\cdot x+3}{5\cdot x-1}\cdot\dfrac{x+2}{x+2}+\dfrac{x-1}{x+2}\cdot\dfrac{5x-1}{5x-1}$

$=\dfrac{2\cdot x^2+7\cdot x+6}{(5x-1)(x+2)}+\dfrac{5\cdot x^2-6\cdot x+1}{(5x-1)(x+2)}$

$=\dfrac{2\cdot x^2+7\cdot x+6+5\cdot x^2-6\cdot x+1}{(5\cdot x-1)\cdot(x+2)}$

$=\dfrac{7\cdot x^2+x+7}{(5\cdot x-1)\cdot(x+2)}$

12/21 completely simplified correctly

Related work

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

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

$2\cdot x^2+7\cdot x+6+5\cdot x^2-6\cdot x+1=7\cdot x^2+x+7$

$7\cdot x^2+x+7$

$D=1^2-4\cdot 7\cdot 7 ▸ {}^-195$

This means that $7\cdot x^2+x+7$ is not factorable and has imaginary roots

Another check x = −2

$7\cdot(^-2)^2+{}^-2+7 ▸ 33$ …x = −2 is not a root of $7\cdot x^2+x+7$

so x+2 is not a factor of $7\cdot x^2+x+7$

Another check x = 1/5

$7\cdot\left(\dfrac{1}{5}\right)^2+\dfrac{1}{5}+7 ▸ \dfrac{187}{25}$ x = $\dfrac{1}{5}$ is not a root of $7\cdot x^2+x+7$

so 5x−1 is not a factor of $7\cdot x^2+x+7$

This is completely simplified

Problem 6 $\frac{x^2+4x}{x+2}+\frac{x^2-2x}{x-7}$

$=\frac{x^2+4x}{x+2}\cdot\frac{x-7}{x-7}+\frac{x^2-2x}{x-7}\cdot\frac{x+2}{x+2}$

$=\frac{x^3-3\cdot x^2-28\cdot x}{(x+2)\cdot(x-7)}+\frac{x^3-4\cdot x}{(x+2)\cdot(x-7)}$

$=\frac{x^3-3\cdot x^2-28\cdot x+x^3-4\cdot x}{(x+2)(x-7)}$

$=\frac{2\cdot x^3-3\cdot x^2-32\cdot x}{(x+2)(x-7)}=\frac{x\cdot(2\cdot x^2-3\cdot x-32)}{(x-7)\cdot(x+2)}$

10/21 completely simplified correctly

Related work

$(x^2+4\cdot x)\cdot(x-7)=x^3-3\cdot x^2-28\cdot x$

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

$x^3-3\cdot x^2-28\cdot x+x^3-4\cdot x=2\cdot x^3-3\cdot x^2-32\cdot x$

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

$2\cdot x^3-3\cdot x^2-32\cdot x=x\cdot(2\cdot x^2-3\cdot x-32)$

D=$(^-3)^2-4\cdot 2\cdot {}^-32 \blacktriangleright 265$

This means that $2x^2-3x-32$ is not factorable and therefore neither $(x+2)$ nor $(x-7)$ are factors of the numerator

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Problem 7 $\dfrac{3x+4}{5\cdot x^3+2x}-\dfrac{2x-5}{x-7}=\dfrac{3x+4}{5\cdot x^3+2x}+\dfrac{-(2x-5)}{x-7}$

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

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

$$=\frac{3\cdot x^2-17\cdot x-28}{(5\cdot x^3+2x)(x-7)}+\frac{{}^-10\cdot x^4+25\cdot x^3-4\cdot x^2+10\cdot x}{(5\cdot x^3+2x)(x-7)}$$

$$=\frac{3\cdot x^2-17\cdot x-28+{}^-10\cdot x^4+25\cdot x^3-4\cdot x^2+10\cdot x}{(5\cdot x^3+2x)(x-7)}$$

$$=\frac{{}^-10\cdot x^4+25\cdot x^3-x^2-7\cdot x-28}{(5\cdot x^3+2x)(x-7)}$$

5/21 completely simplified correctly

Related Work

$(3\cdot x+4)\cdot(x-7)=3\cdot x^2-17\cdot x-28$

$(-2x+5)\cdot(5x^3+2x)={}^-10\cdot x^4+25\cdot x^3-4\cdot x^2+10\cdot x$

$3\cdot x^2-17\cdot x-28+{}^-10\cdot x^4+25\cdot x^3-4\cdot x^2+10\cdot x$

$={}^-10\cdot x^4+25\cdot x^3-x^2-7\cdot x-28$

$(5\cdot x^3+2x)(x-7)=5\cdot x^4-35\cdot x^3+2\cdot x^2-14\cdot x$

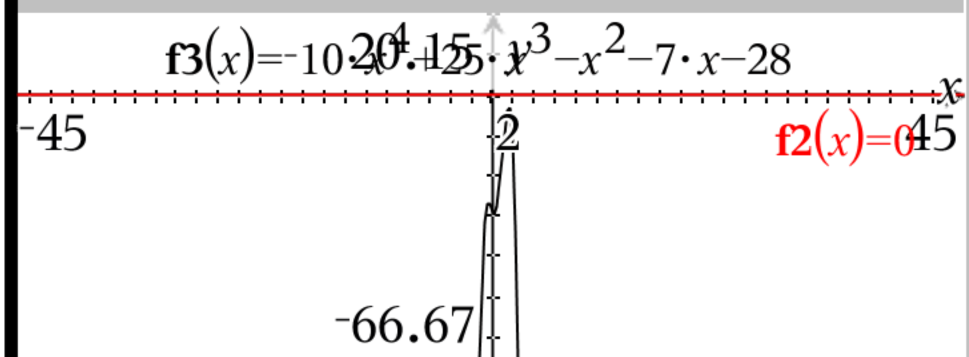
$(5\cdot x^3+2x)(x-7)=x\cdot(x-7)\cdot(5\cdot x^2+2)$

roots of ${}^-10\cdot x^4+25\cdot x^3-x^2-7\cdot x-28$ are IMAGINARY also means that this is simplified (see below)

${}^-10\cdot 7^4+25\cdot 7^3-1\cdot 7^2+-7\cdot 7-45 \blacktriangleright {}^-15578$

also means that x = 7 is NOT a root of numerator

and (x−7) is not a factor of ${}^-10\cdot x^4+25\cdot x^3-x^2-7\cdot x-28$



Problem 8 $\frac{x^2-4\cdot x}{5\cdot x+2}-\frac{4x^2-10\cdot x}{2x^2+6x}$

This problem has a fraction that can be simplified first

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

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

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

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

$=\frac{x^3-x^2-12\cdot x}{(x+3)\cdot(5\cdot x+2)}+\frac{-10\cdot x^2+21\cdot x+10}{(x+3)(5x+2)}$

$=\frac{x^3-x^2-12\cdot x+-10\cdot x^2+21\cdot x+10}{(x+3)\cdot(5\cdot x+2)}=\frac{x^3-11\cdot x^2+9\cdot x+10}{(x+3)(5x+2)}$

2/21 completely simplified correctly

Related work

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

$(-2x+5)\cdot(5x+2)=-10\cdot x^2+21\cdot x+10$

$x^3-x^2-12\cdot x+-10\cdot x^2+21\cdot x+10=x^3-11\cdot x^2+9\cdot x+10$

$(x+3)(5x+2)=5\cdot x^2+17\cdot x+6$

$x^3-11\cdot x^2+9\cdot x+10$ cannot be factored

OR

$(-3)^3-11\cdot(-3)^2+9\cdot -3+10 \blacktriangleright -143$

this means that x $=-3$ is not a root of $x^3-11\cdot x^2+9\cdot x+10$

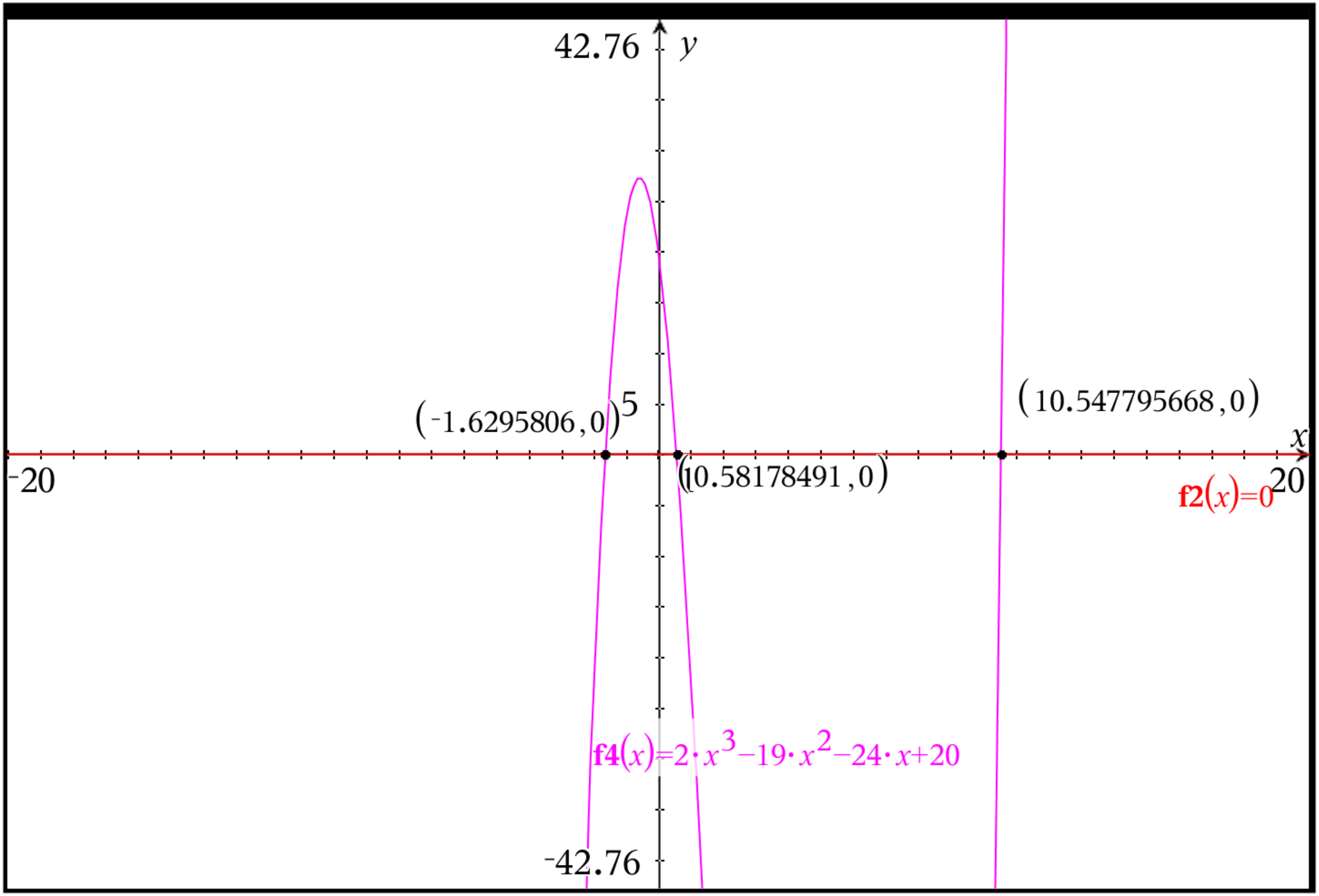
and (x+3) is not a factor of $x^3-11\cdot x^2+9\cdot x+10$

OR

$\left(\frac{-5}{2}\right)^3-11\cdot\left(\frac{-5}{2}\right)^2+\frac{9\cdot -5}{2}+10 \blacktriangleright \frac{-775}{8}$

this means that x $=\frac{-5}{2}$ is not a root of $x^3-11\cdot x^2+9\cdot x+10$

and $(5x+2)$ is not a factor of $x^3-11\cdot x^2+9\cdot x+10$



42.76
y
5
$(^-1.6295806, 0)$
$(10.547795668, 0)$
$(0.58178491, 0)$
x
$^-20$
20
$\mathbf{f2}(x)=0$
$\mathbf{f4}(x)=2\cdot x^3-19\cdot x^2-24\cdot x+20$
$^-42.76$