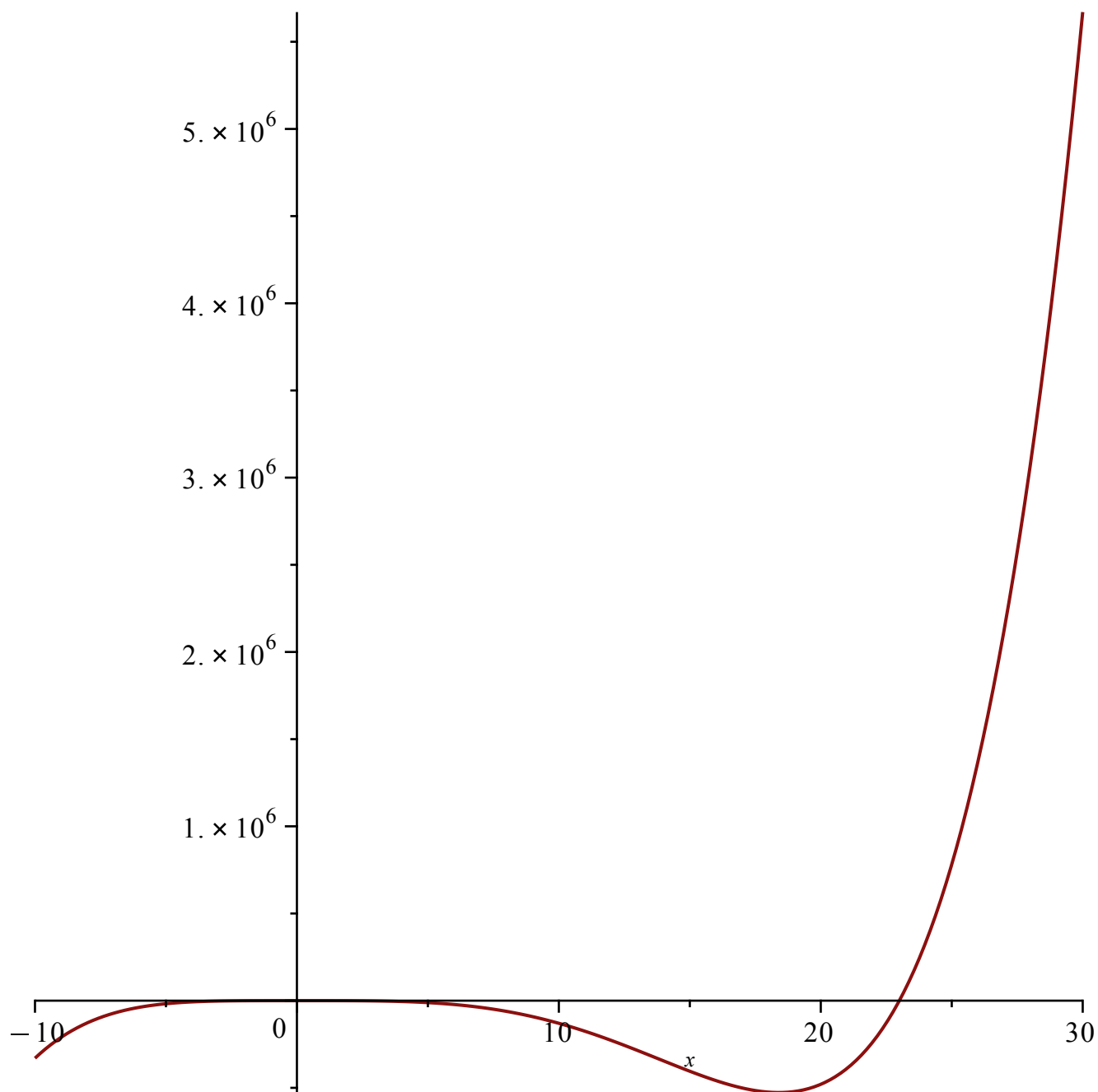


Sara Abdorab

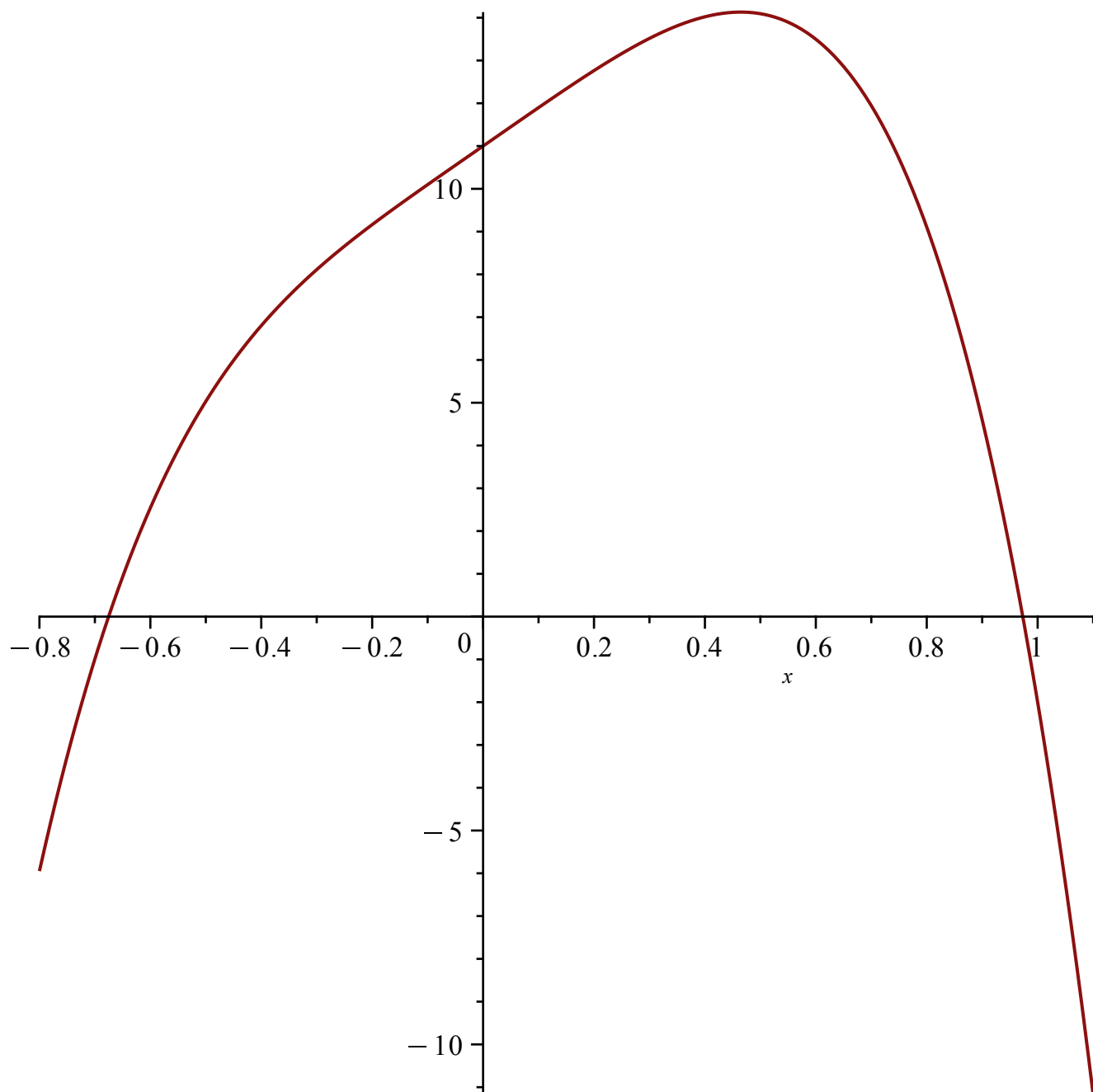
HomeWork 3:

Problem 1:

$$\text{plot}(x^5 - 23 \cdot x^4 + 9 \cdot x + 11)$$



$\text{plot}(x^5 - 23 \cdot x^4 + 9 \cdot x + 11, x = -0.8 .. 1.1)$



$$f := x \mapsto x^5 - 23 \cdot x^4 + 9 \cdot x + 11 = 0$$

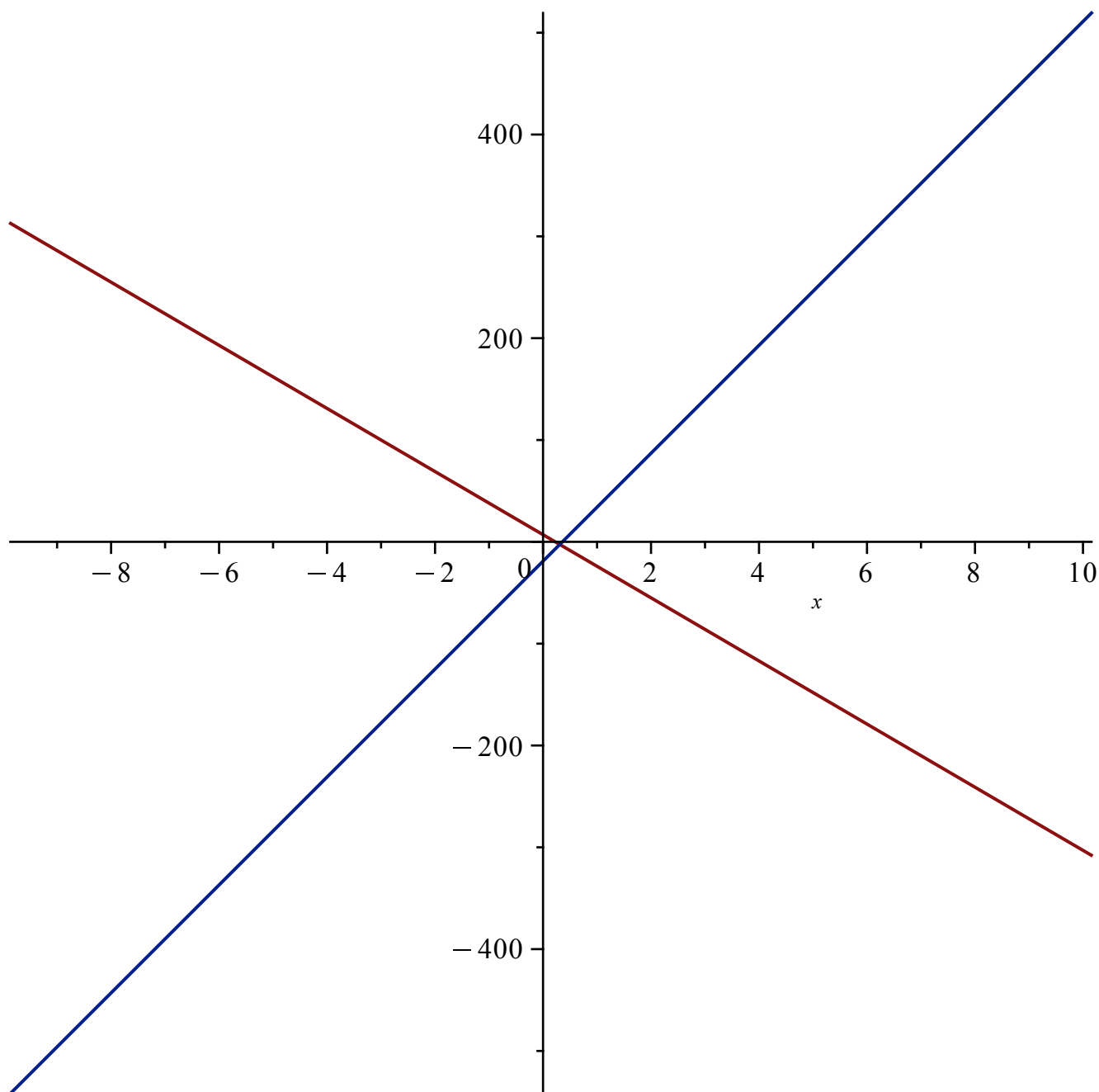
$$f := x \mapsto x^5 - 23 \cdot x^4 + 9 \cdot x + 11 = 0 \quad (1)$$

$$fsolve(x^5 - 23 \cdot x^4 + 9 \cdot x + 11 = 0, x)$$

$$-0.6752661998, 0.9732004822, 22.99922091 \quad (2)$$

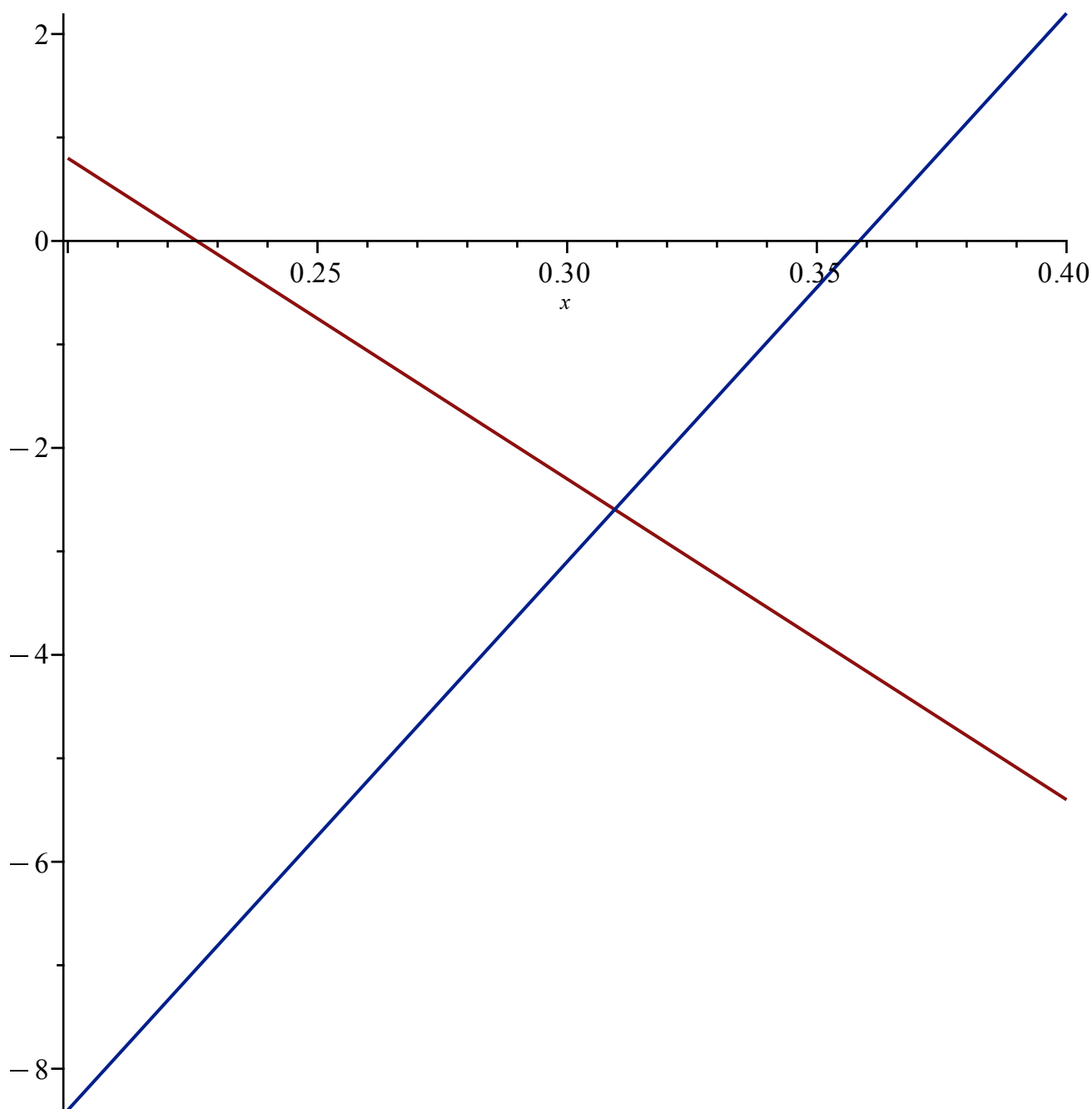
Problem 2A:

$\text{plot}(\{53 \cdot x - 19, -31 \cdot x + 7\})$



Problem 2B:

$\text{plot}(\{53 \cdot x - 19, -31 \cdot x + 7\}, x = 0.2 \dots 0.4)$



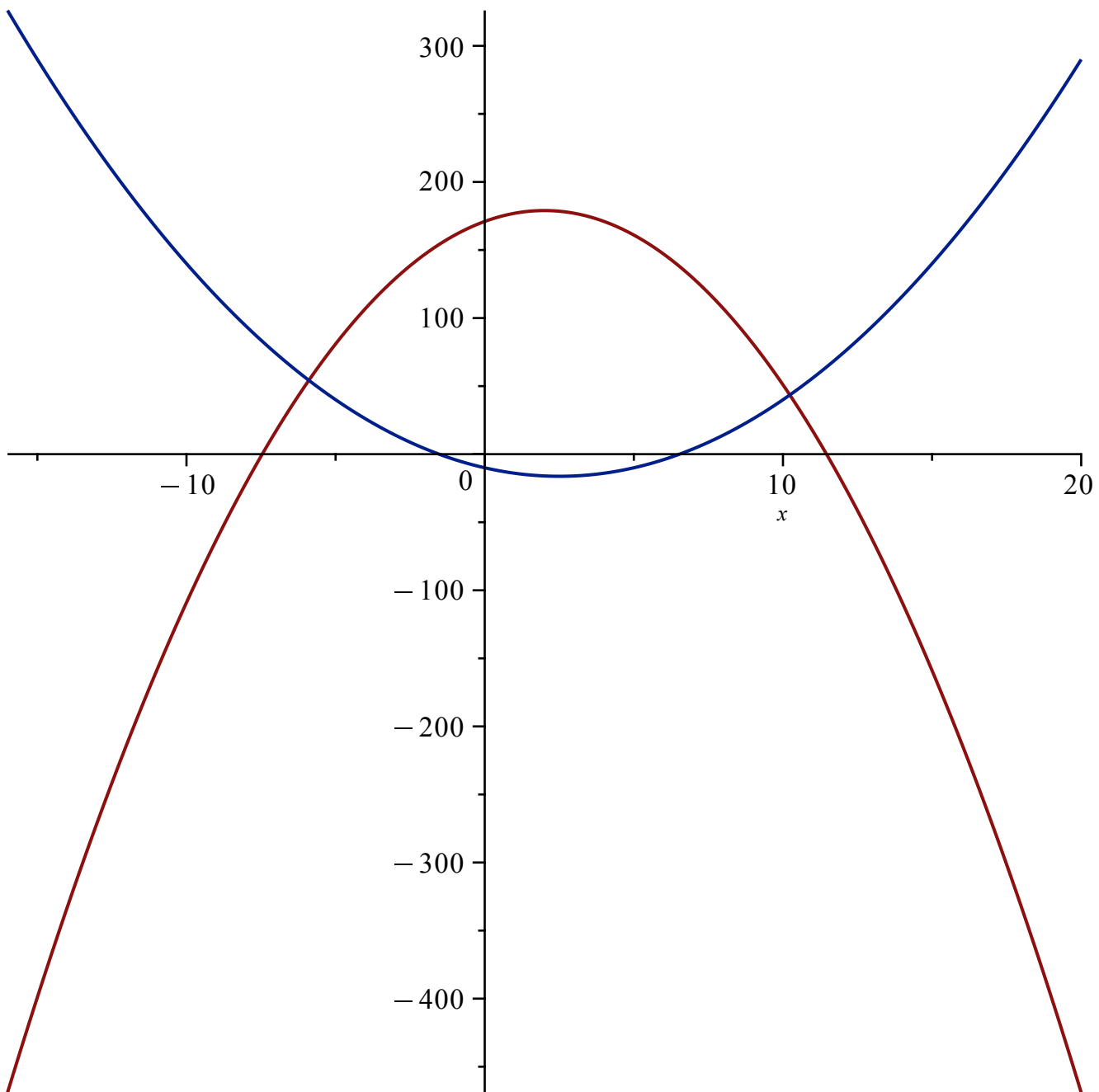
Problem 2C:

$$\text{fsolve}(\{y = 53 \cdot x - 19, y = -31 \cdot x + 7\}, \{x, y\})$$

$$\{x = 0.3095238095, y = -2.595238095\} \quad (3)$$

Problem 3:

$$\text{plot}(\{x^2 - 5 \cdot x - 10, -2 \cdot x^2 + 8 \cdot x + 171\})$$



Problem 4A:

$$\text{Limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^4 + 100 \cdot x^2 + x - 19}, x = \infty \right) = \text{limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^4 + 100 \cdot x^2 + x - 19}, x = \infty \right)$$

$$\lim_{x \rightarrow \infty} \frac{2x^4 + 7x - 9}{5x^4 + 100x^2 + x - 19} = \frac{2}{5}$$

(4)

Problem 4B:

$$\begin{aligned} \text{Limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^3 + 100 \cdot x^2 + x - 19}, x = \infty \right) &= \text{limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^3 + 100 \cdot x^2 + x - 19}, x = \infty \right) \\ \lim_{x \rightarrow \infty} \frac{2 x^4 + 7 x - 9}{5 x^3 + 100 x^2 + x - 19} &= \infty \end{aligned} \quad (5)$$

Problem 4C:

$$\begin{aligned} \text{Limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^5 + 100 \cdot x^2 + x - 19}, x = \infty \right) &= \text{limit} \left(\frac{2 \cdot x^4 + 7 \cdot x - 9}{5 \cdot x^3 + 100 \cdot x^2 + x - 19}, x = \infty \right) \\ \lim_{x \rightarrow \infty} \frac{2 x^4 + 7 x - 9}{5 x^5 + 100 x^2 + x - 19} &= \infty \end{aligned} \quad (6)$$

Problem 4D:

$$\begin{aligned} \text{Limit} \left(\frac{\ln(x)^3}{\text{sqrt}(x)}, x = \infty \right) &= \text{limit} \left(\frac{\ln(x)^3}{\text{sqrt}(x)}, x = \infty \right) \\ \lim_{x \rightarrow \infty} \frac{\ln(x)^3}{\sqrt{x}} &= 0 \end{aligned} \quad (7)$$

Problem 4E:

$$\begin{aligned} \text{Limit} \left(\frac{\sin(6 \cdot x)}{14 \cdot x}, x = 0 \right) &= \text{limit} \left(\frac{\sin(6 \cdot x)}{14 \cdot x}, x = 0 \right) \\ \lim_{x \rightarrow 0} \frac{\sin(6 x)}{14 x} &= \frac{3}{7} \end{aligned} \quad (8)$$

Problem 5A:

$$\begin{aligned} f &:= x \mapsto \frac{-2 \cdot x}{\text{sqrt}(x^2 + 1)} \\ f &:= x \mapsto -\frac{2 \cdot x}{\sqrt{x^2 + 1}} \end{aligned} \quad (9)$$

$$\begin{aligned} &\xrightarrow{\text{differentiate}} \\ x &\mapsto -\frac{2}{\sqrt{x^2 + 1}} + \frac{2 \cdot x^2}{(\sqrt{x^2 + 1})^2 \cdot \sqrt{x^2 + 1}} \end{aligned} \quad (10)$$

Problem 5B:

$$f := x \mapsto \frac{x}{2} + \ln\left(\frac{x}{x+3}\right)$$

$$f := x \mapsto \frac{x}{2} + \ln\left(\frac{x}{3+x}\right)$$

(11)

differentiate
→

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

(12)

Problem 5C:

$$f := x \mapsto \frac{3 \cdot x}{2} \left(1 + 4\mathrm{e}^{-\frac{x}{3}}\right)$$

$$f := x \mapsto \frac{3 \cdot x \cdot \left(1 + 4 \cdot \mathrm{e}^{-\frac{x}{3}}\right)}{2}$$

(13)

differentiate
→

$$x \mapsto \frac{3}{2} + 6 \cdot \mathrm{e}^{-\frac{x}{3}} - 2 \cdot x \cdot \mathrm{e}^{-\frac{x}{3}}$$

(14)

Problem 6

```
for n from 0 to 10 do n, plot(x4 - 3·x2 - 4 + n, ); end do;
```

