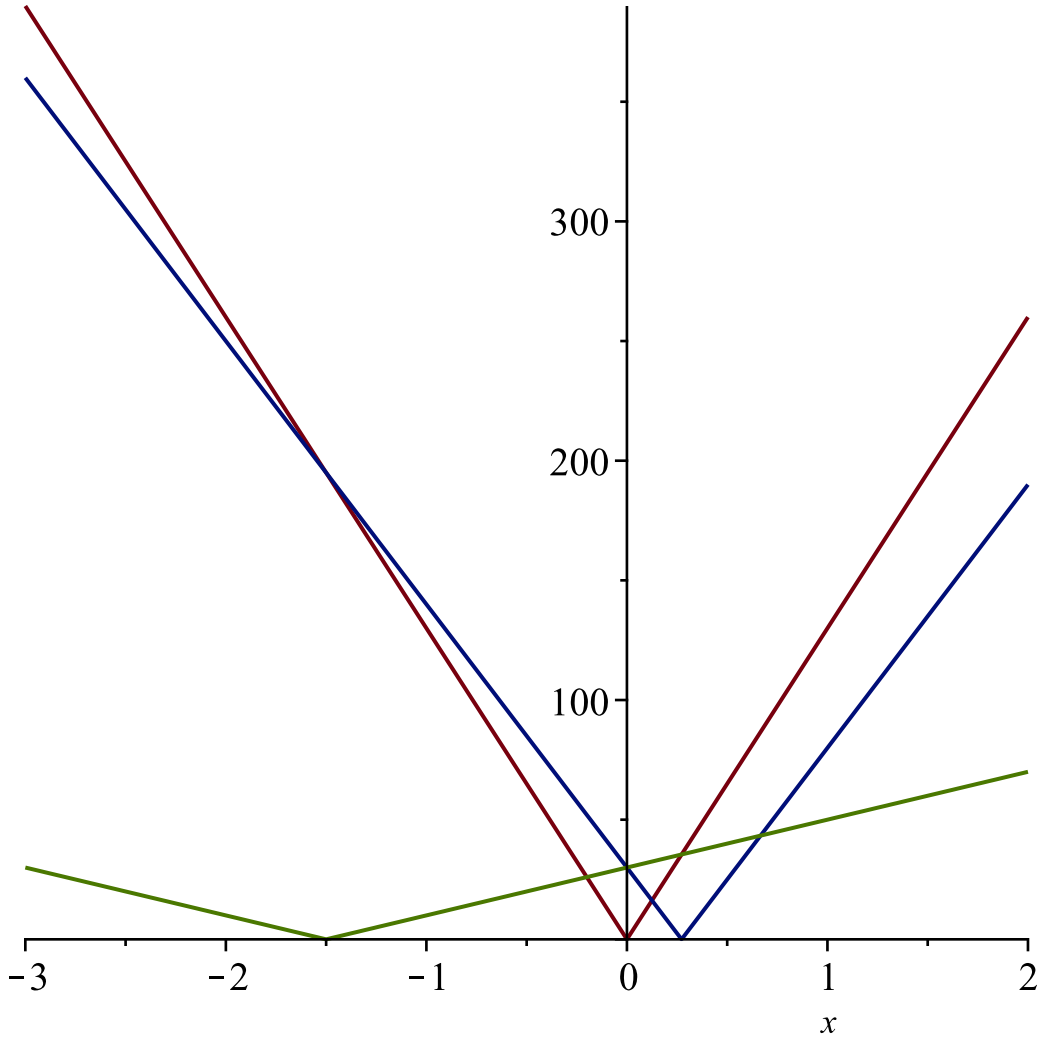
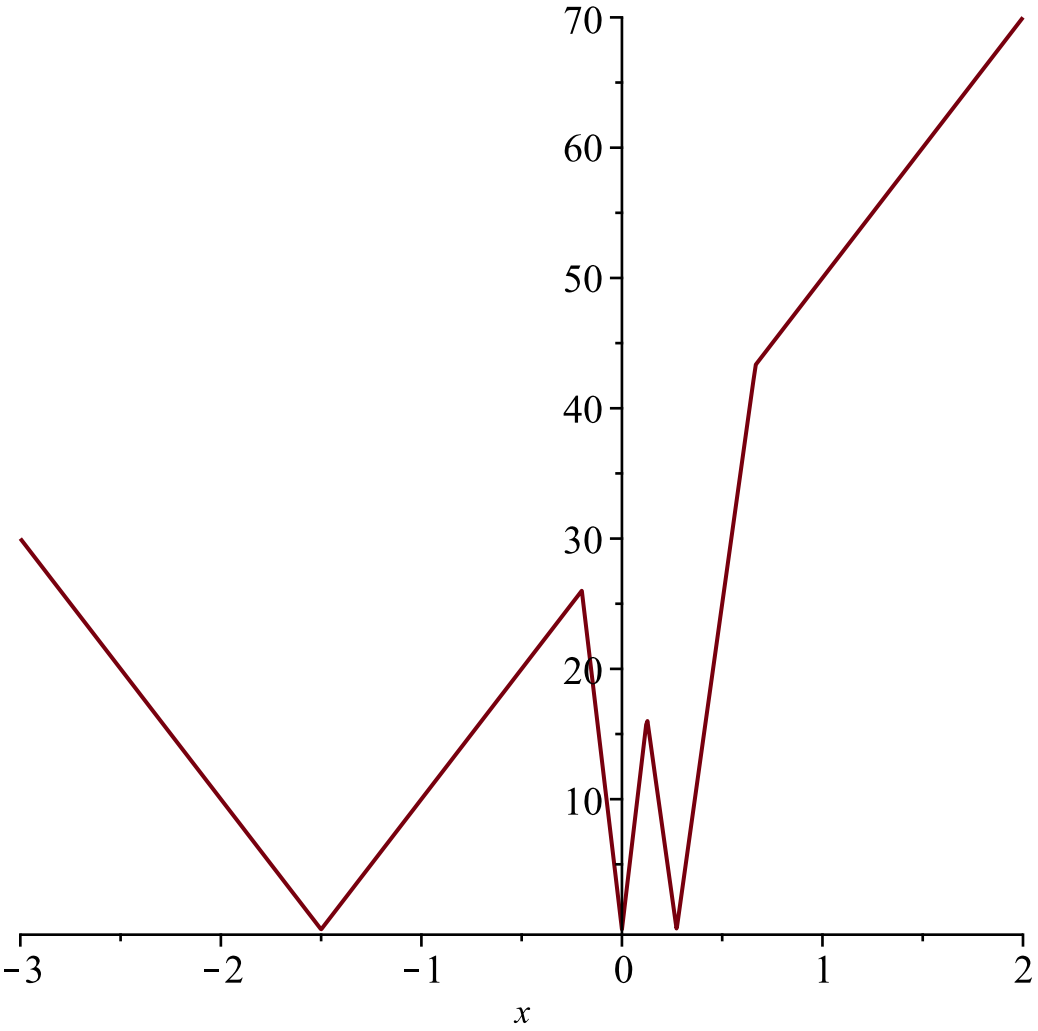
```
> plot( [abs(130·x), abs(-30 + 110·x), abs(-30 - 20·x)], x =-3 ..2)
```




```
> plot(min(abs(130·x), abs(-30 + 110·x), abs(-30 - 20·x)), x =-3 ..2)
```




```
> solve(abs(130·x) = abs(-30 + 110·x)); solve(abs(130·x) = abs(-30 - 20·x));
```

$$-\frac{3}{2}, \frac{1}{8}$$

$$-\frac{1}{5}, \frac{3}{11} \qquad \textbf{(1)}$$

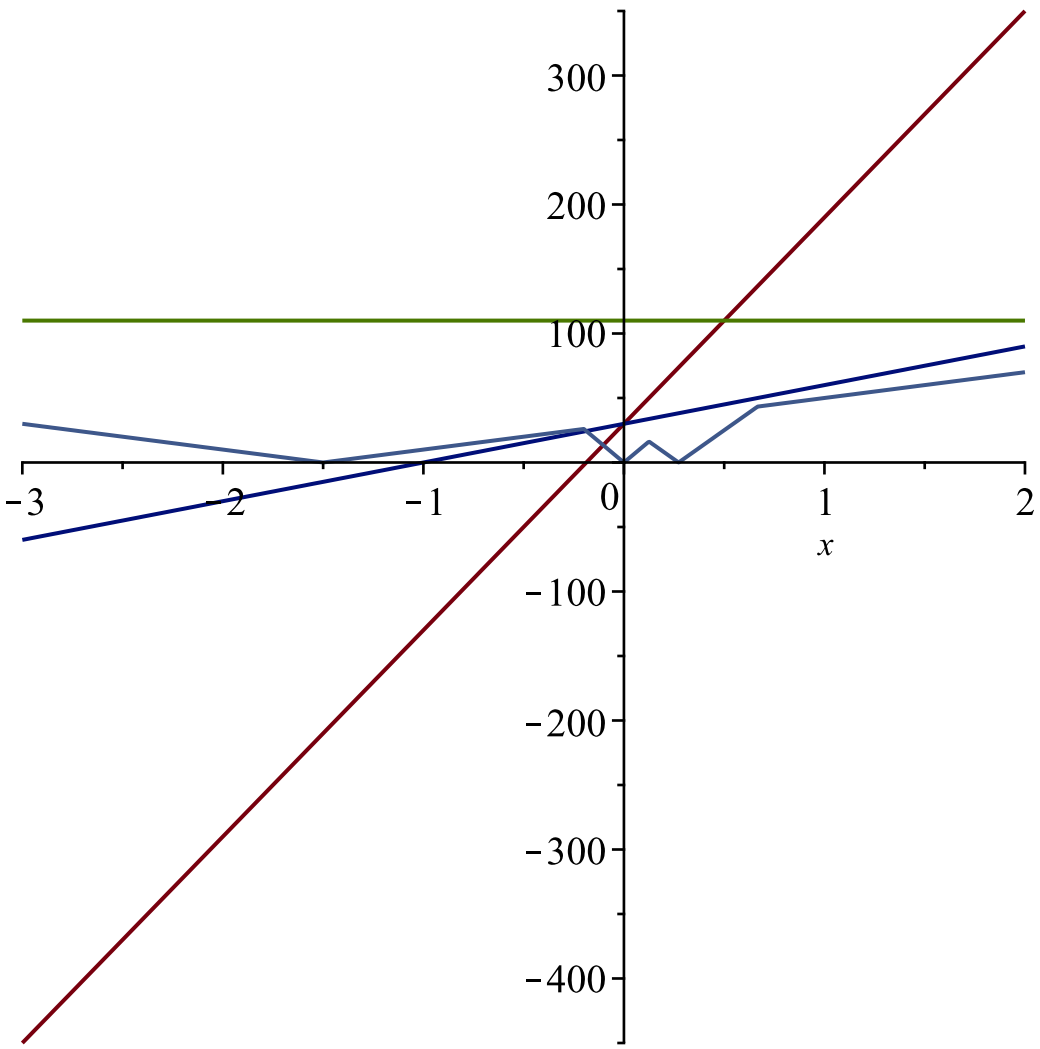
```
> simplify(subs(x = -1/5, [abs(130·x), abs(-30 + 110·x), abs(-30 - 20·x)]))
```

$$[26, 52, 26] \qquad \textbf{(2)}$$

```
> simplify(subs(x = 1/8, [abs(130·x), abs(-30 + 110·x), abs(-30 - 20·x)]))
```

$$\left[\frac{65}{4}, \frac{65}{4}, \frac{65}{2}\right] \qquad \textbf{(3)}$$

```
> plot([30 + 160·x, 30 + 30·x, 60 + 50, min(abs(30 + 160·x - (30 + 30·x)), abs(30 + 30·x
      - (60 + 50·x)), abs(60 + 50·x - (30 + 160·x)))], x = -3..2)
```



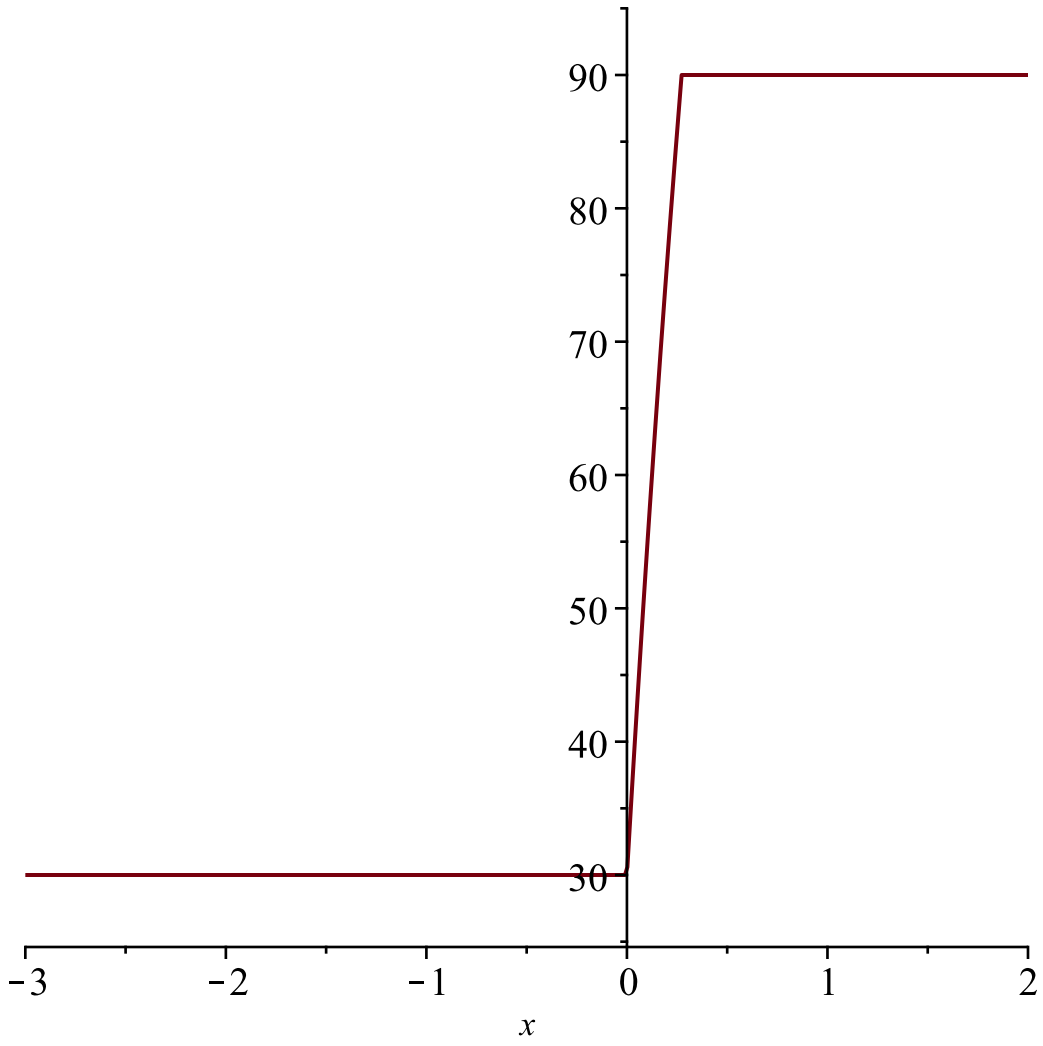
>

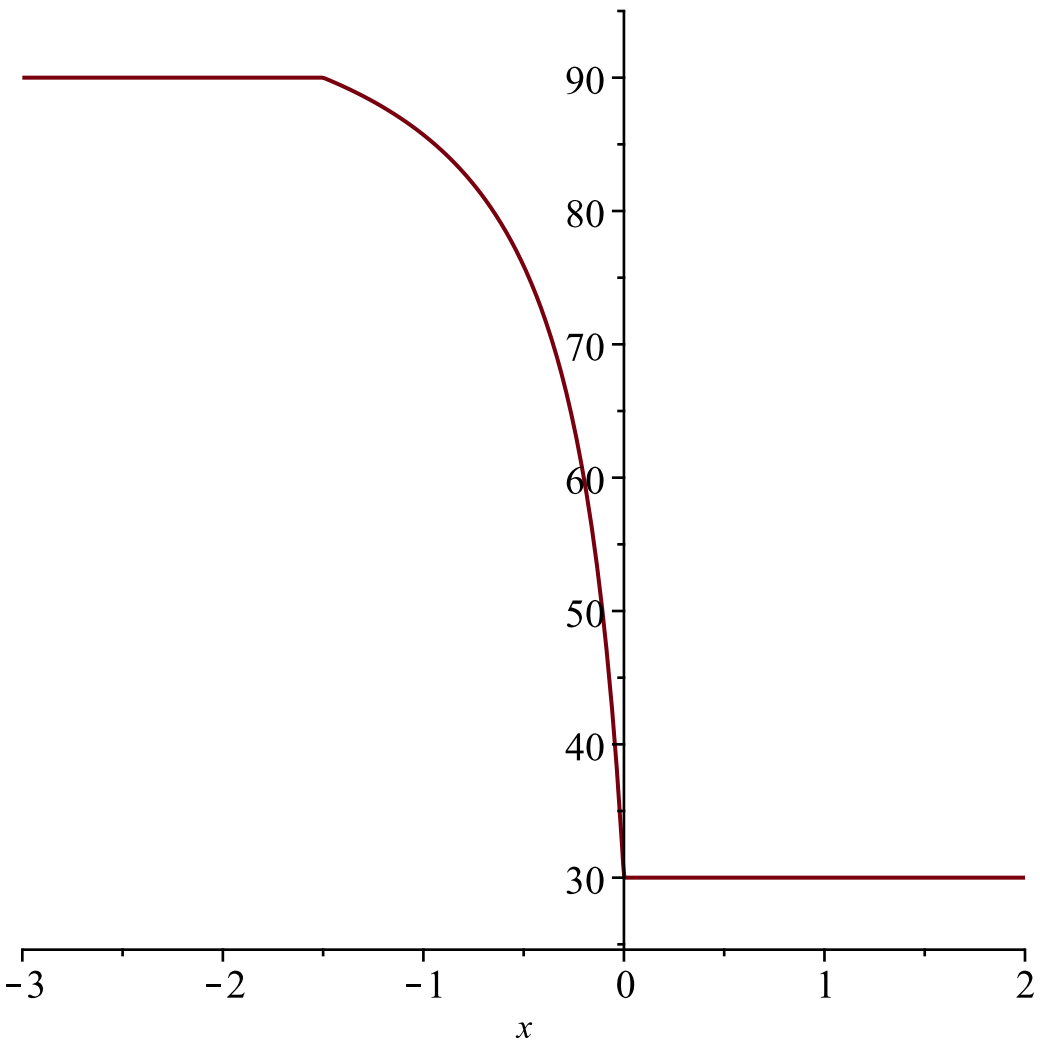
> $plot\left(\min(30, 30, 60) + \frac{\max(30, 30, 60)\cdot(30 + 160\cdot x - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x))}{\max(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x) - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x)}, x = -3..2, 25..95\right);$

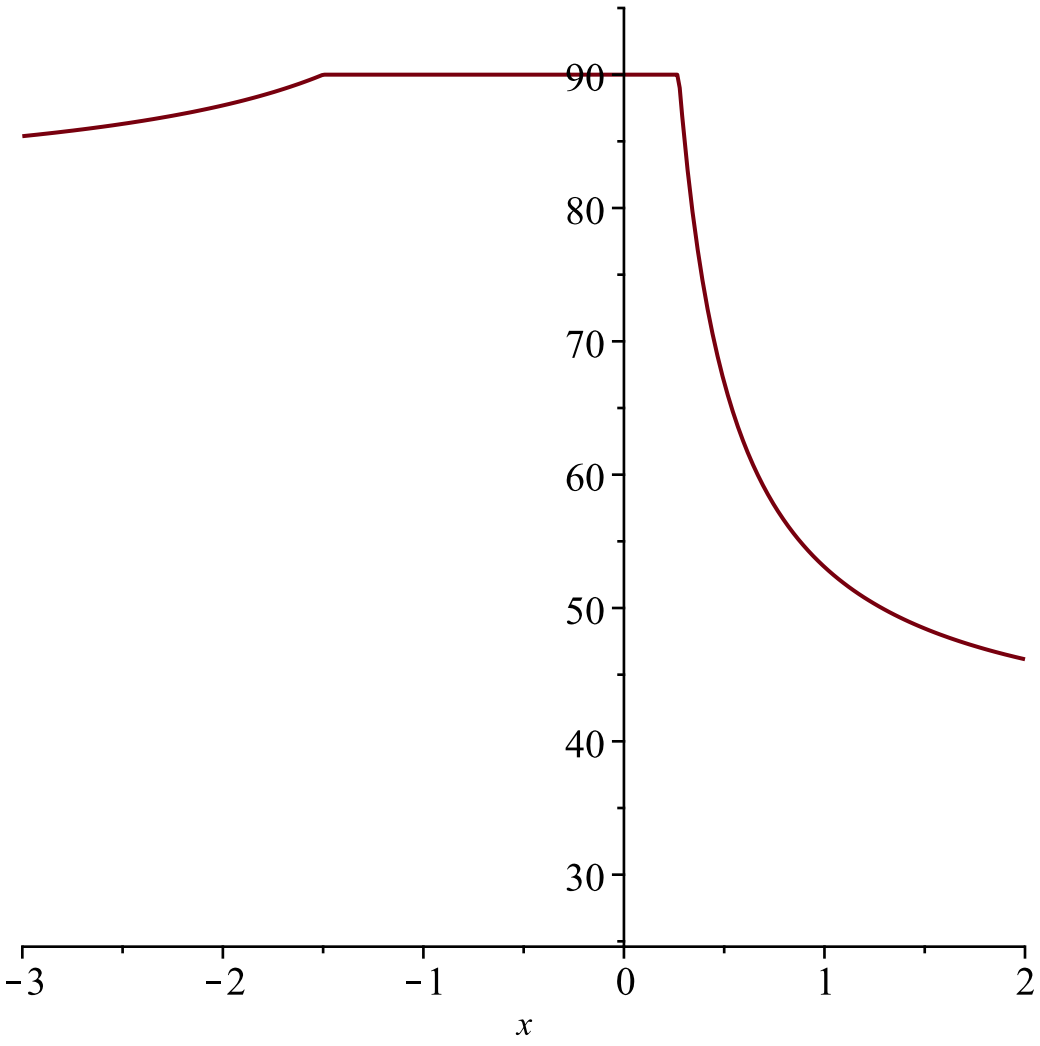
$plot\left(\min(30, 30, 60) + \frac{\max(30, 30, 60)\cdot(30 + 30\cdot x - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x))}{\max(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x) - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x)}, x = -3..2, 25..95\right);$

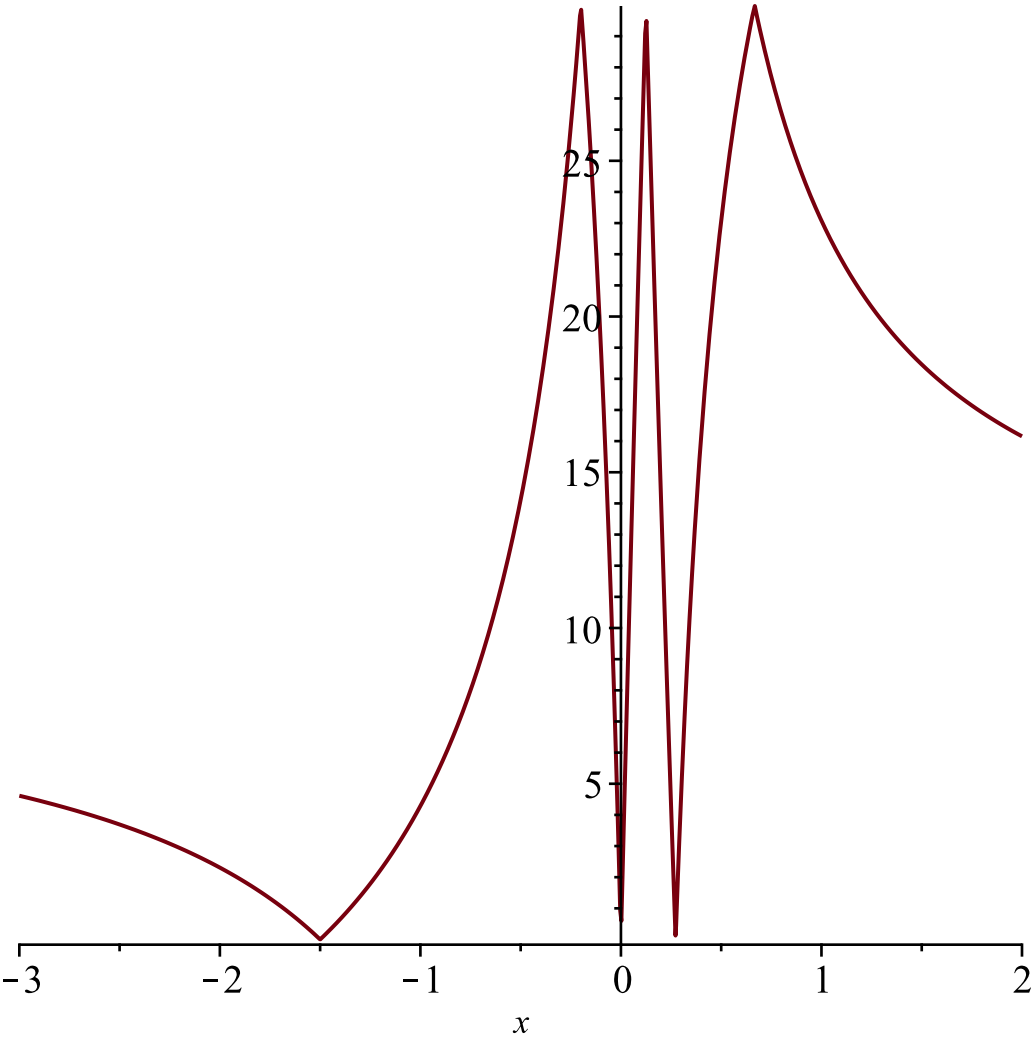
$plot\left(\min(30, 30, 60) + \frac{\max(30, 30, 60)\cdot(60 + 50\cdot x - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x))}{\max(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x) - \min(30 + 160\cdot x, 30 + 30\cdot x, 60 + 50\cdot x)}, x = -3..2, 25..95\right);$

$$plot\left(\left(\max(30, 30, 60)\cdot\min\left(\operatorname{abs}(30+160\cdot x-(30+30\cdot x)), \operatorname{abs}(30+30\cdot x-(60+50\cdot x)), \operatorname{abs}(60+50\cdot x-(30+160\cdot x))\right)\right) \Big/ \left(\max(30+160\cdot x, 30+30\cdot x, 60+50\cdot x)-\min(30+160\cdot x, 30+30\cdot x, 60+50\cdot x)\right), x=-3..2\right);$$

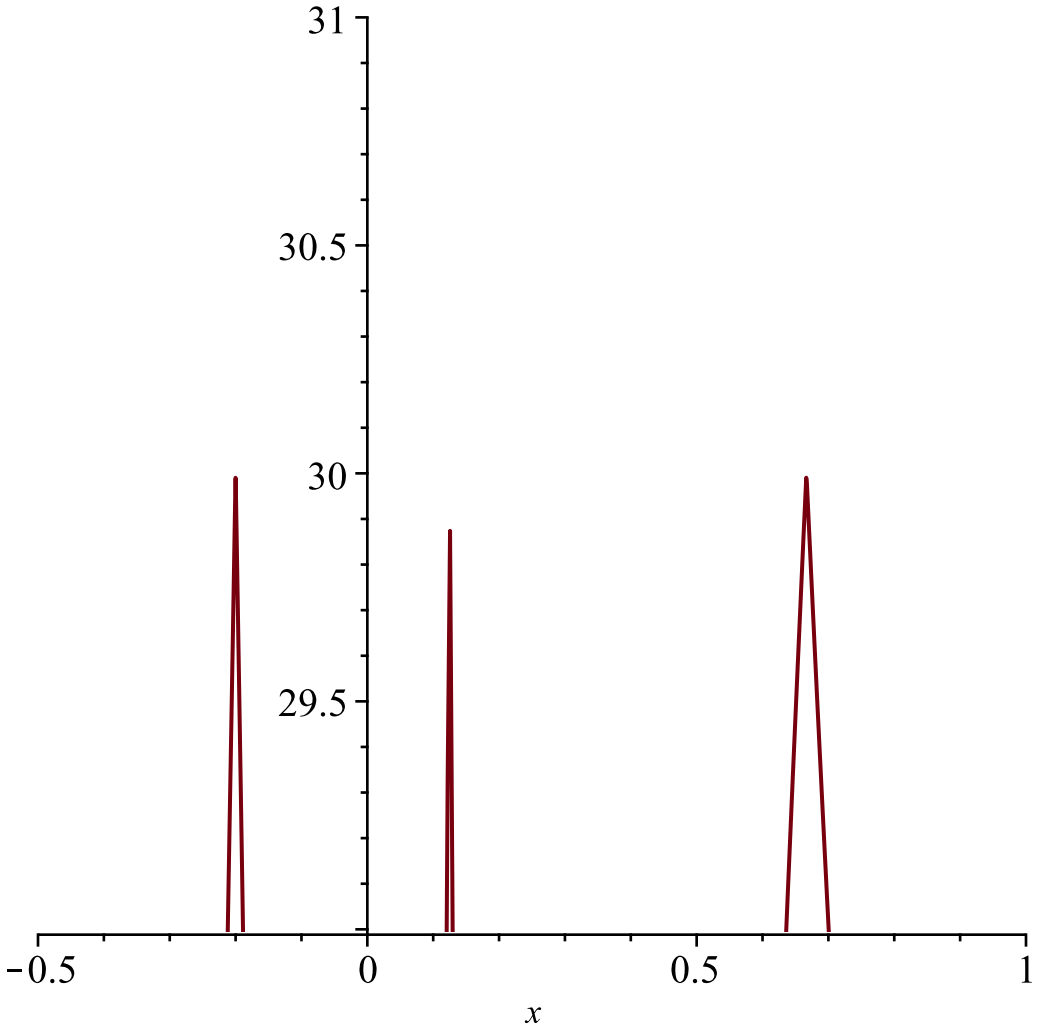



90
80
70
60
50
40
30
−3
−2
−1
0
1
2
x


90
80
70
60
50
40
30
−3
−2
−1
0
1
2
x



> $plot\left((\max(30, 30, 60) \cdot \min(\mathrm{abs}(30 + 160 \cdot x - (30 + 30 \cdot x)), \mathrm{abs}(30 + 30 \cdot x - (60 + 50 \cdot x)), \mathrm{abs}(60 + 50 \cdot x - (30 + 160 \cdot x)))) / (\max(30 + 160 \cdot x, 30 + 30 \cdot x, 60 + 50 \cdot x) - \min(30 + 160 \cdot x, 30 + 30 \cdot x, 60 + 50 \cdot x)), x = -\frac{1}{2} .. 1, 29 .. 31 \right)$




```
> limit((max(30, 30, 60)·min(abs(30 + 160·x − (30 + 30·x)), abs(30 + 30·x − (60 + 50·x)),
      abs(60 + 50·x − (30 + 160·x))))/(max(30 + 160·x, 30 + 30·x, 60 + 50·x) − min(30
      + 160·x, 30 + 30·x, 60 + 50·x)), x = -infinity)
```

$$\frac{120}{13} \tag{4}$$

```
> limit((max(30, 30, 60)·min(abs(30 + 160·x − (30 + 30·x)), abs(30 + 30·x − (60 + 50·x)),
      abs(60 + 50·x − (30 + 160·x))))/(max(30 + 160·x, 30 + 30·x, 60 + 50·x) − min(30
      + 160·x, 30 + 30·x, 60 + 50·x)), x = infinity)
```

$$\frac{120}{13} \tag{5}$$

```
> extrema((max(30, 30, 60)·min(abs(30 + 160·x − (30 + 30·x)), abs(30 + 30·x − (60 + 50
      ·x)), abs(60 + 50·x − (30 + 160·x))))/(max(30 + 160·x, 30 + 30·x, 60 + 50·x)
      − min(30 + 160·x, 30 + 30·x, 60 + 50·x)), x)
```

$$\{0\} \tag{6}$$

```
> with(Optimization):
> Maximize((max(30, 30, 60)·min(abs(30 + 160·x − (30 + 30·x)), abs(30 + 30·x − (60 + 50
      ·x)), abs(60 + 50·x − (30 + 160·x))))/(max(30 + 160·x, 30 + 30·x, 60 + 50·x)
      − min(30 + 160·x, 30 + 30·x, 60 + 50·x)))
```

$$[29.9999999999999893, [x = 0.666666666666667]] \tag{7}$$

```
> enlarge := proc(points, minA, maxA)
  local a, d, m, i, p, j, q, f, minX, maxX;
  a := [ ]; d := [ ]; m := [ ];
  for i from 1 to nops(points)
  do
  p := points[i];
  a := [op(a), p[1]];
  m := [op(m), p[1] + p[2]·x];
  for j from i + 1 to nops(points)
  do
  q := points[j];
  d := [op(d), abs(p[1] + p[2]·x - q[1] - q[2]·x)];
  end do;
  end do;
  minX := min(op(a)); maxX := max(op(a));
  f := max(op(a))·min(op(d)) / (max(op(m)) - min(op(m)));
  print(f);
  print(limit(f, x = -infinity));
  print(limit(f, x = infinity));
  print(Maximize(f));
  plot([f, (maxX - minX)/(nops(points) - 1)], x = minA..maxA);
  end proc;
```

(8)

```
enlarge := proc(points, minA, maxA)
    local a, d, m, i, p, j, q, f, minX, maxX;
    a := [ ];
    d := [ ];
    m := [ ];
    for i to nops(points) do
        p := points[i];
        a := [op(a), p[1]];
        m := [op(m), x*p[2] + p[1]];
        for j from i + 1 to nops(points) do
            q := points[j]; d := [op(d), abs(x*p[2] - x*q[2] + p[1] - q[1])]
        end do
    end do;
    minX := min(op(a));
    maxX := max(op(a));
    f := max(op(a)) * min(op(d)) / (max(op(m)) - min(op(m)));
    print(f);
    print(limit(f, x = -∞));
    print(limit(f, x = ∞));
    print(Optimization:-Maximize(f));
    plot([f, (maxX - minX)/(nops(points) - 1)], x = minA..maxA)
end proc
```

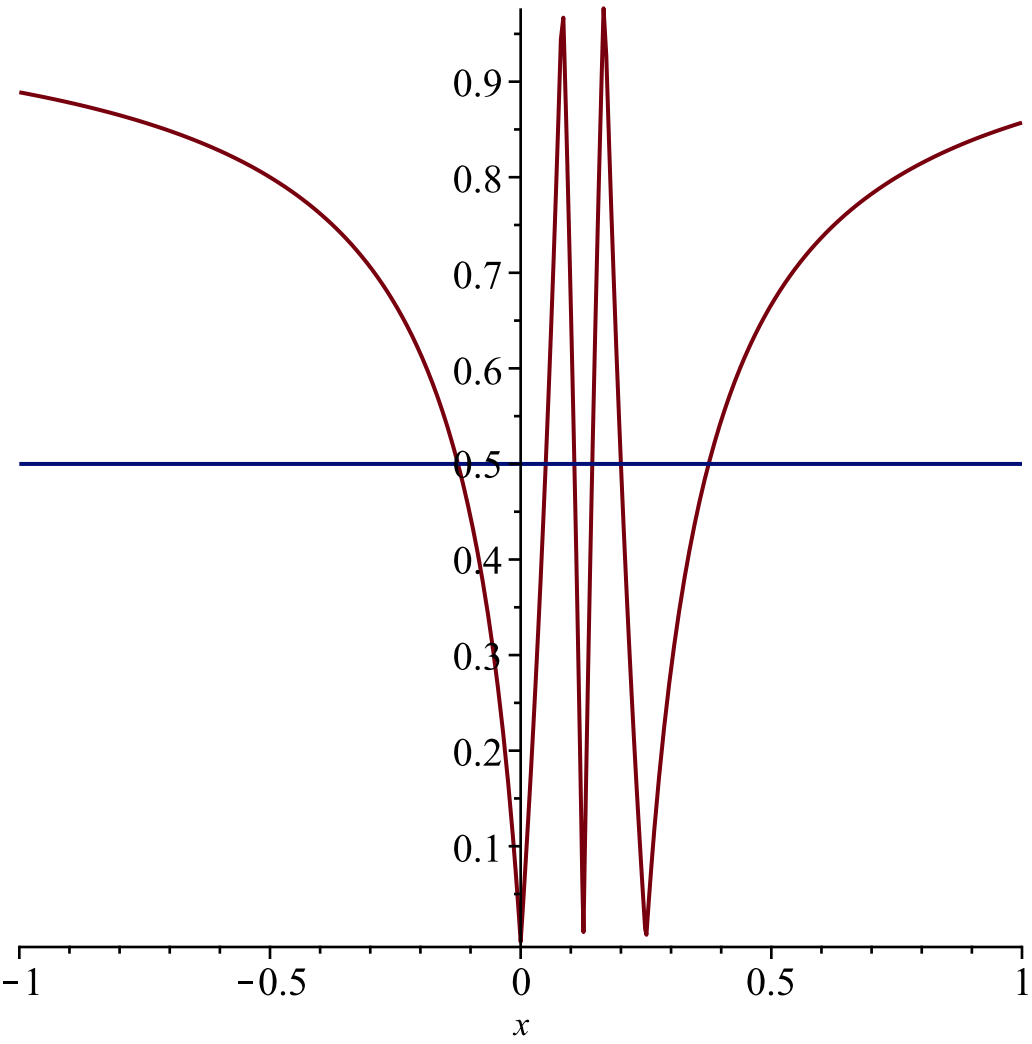
```
> with(Optimization) : enlarge([[2, 1], [1, 5], [2, -3]], -1, 1);
```

$$\frac{2\min(4|x|, |4x-1|, |8x-1|)}{\max(-3x+2, x+2, 5x+1) - \min(-3x+2, x+2, 5x+1)}$$

$$1$$

$$1$$

$$[0.99999987911896571, [x = 1.03407466555780\ 10^{6}]]$$



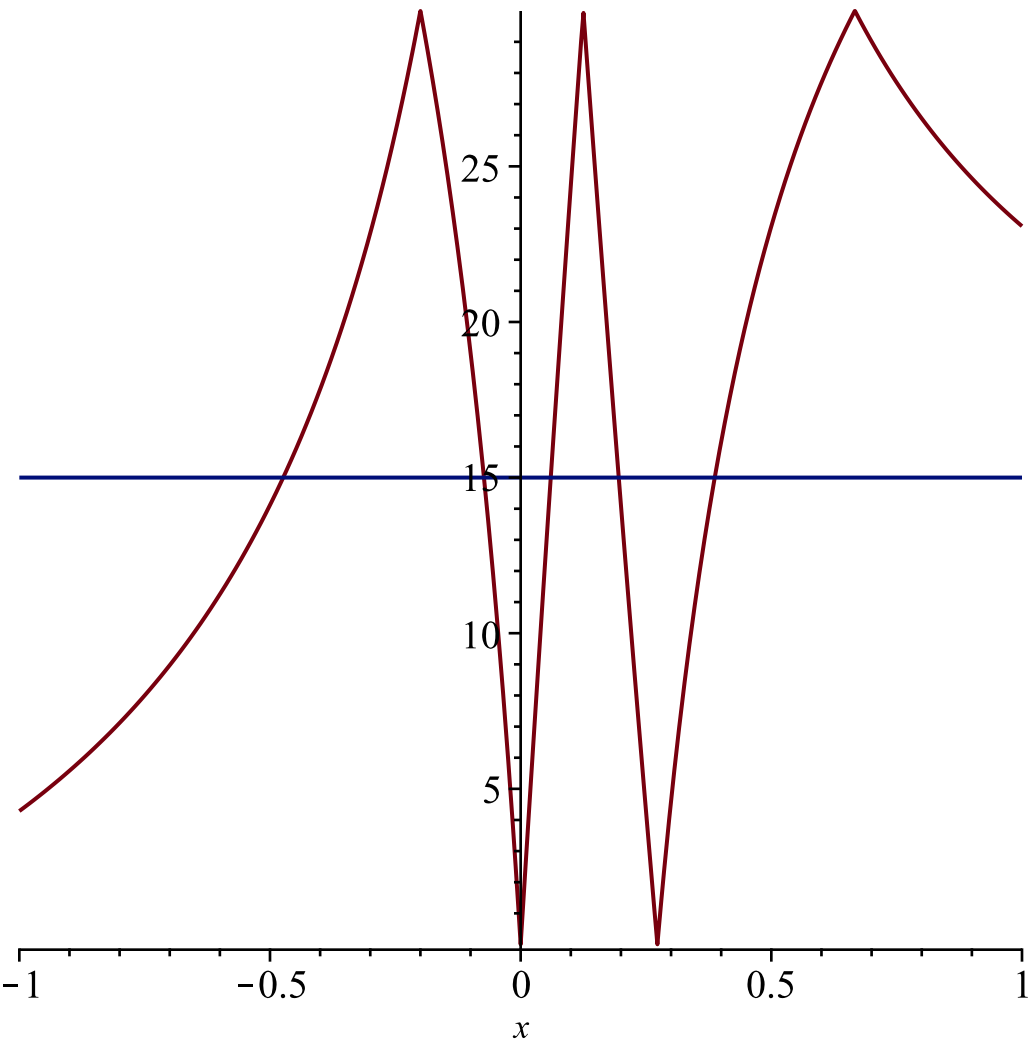

```
> enlarge([[30, 160], [30, 30], [60, 50]], -1, 1);
```

$$\frac{60\min(130|x|, 10|2x+3|, 10|11x-3|)}{\max(30x+30, 50x+60, 160x+30) - \min(30x+30, 50x+60, 160x+30)}$$

$$\frac{120}{13}$$

$$\frac{120}{13}$$

$$[29.9999999999999893, [x = 0.666666666666667]]$$



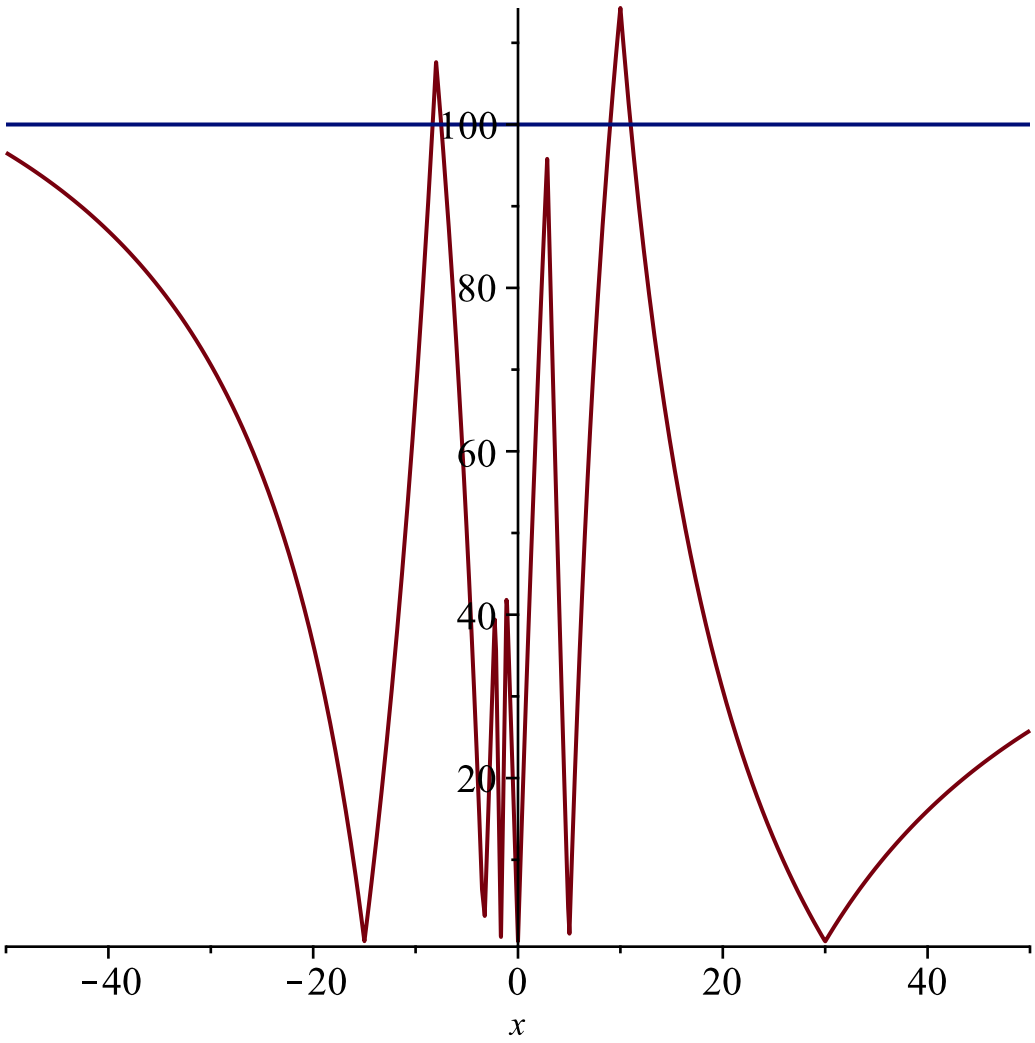

```
> enlarge([[100, 60], [100, 30], [400, 50], [200, 90]], -50, 50)
```

$$(400 \min(30\,|x|, 10\,|x-30|, 40\,|x-5|, 20\,|x+15|, 20\,|3x+5|, 10\,|3x+10|)) / (\max(30x+100, 50x+400, 60x+100, 90x+200) - \min(30x+100, 50x+400, 60x+100, 90x+200))$$

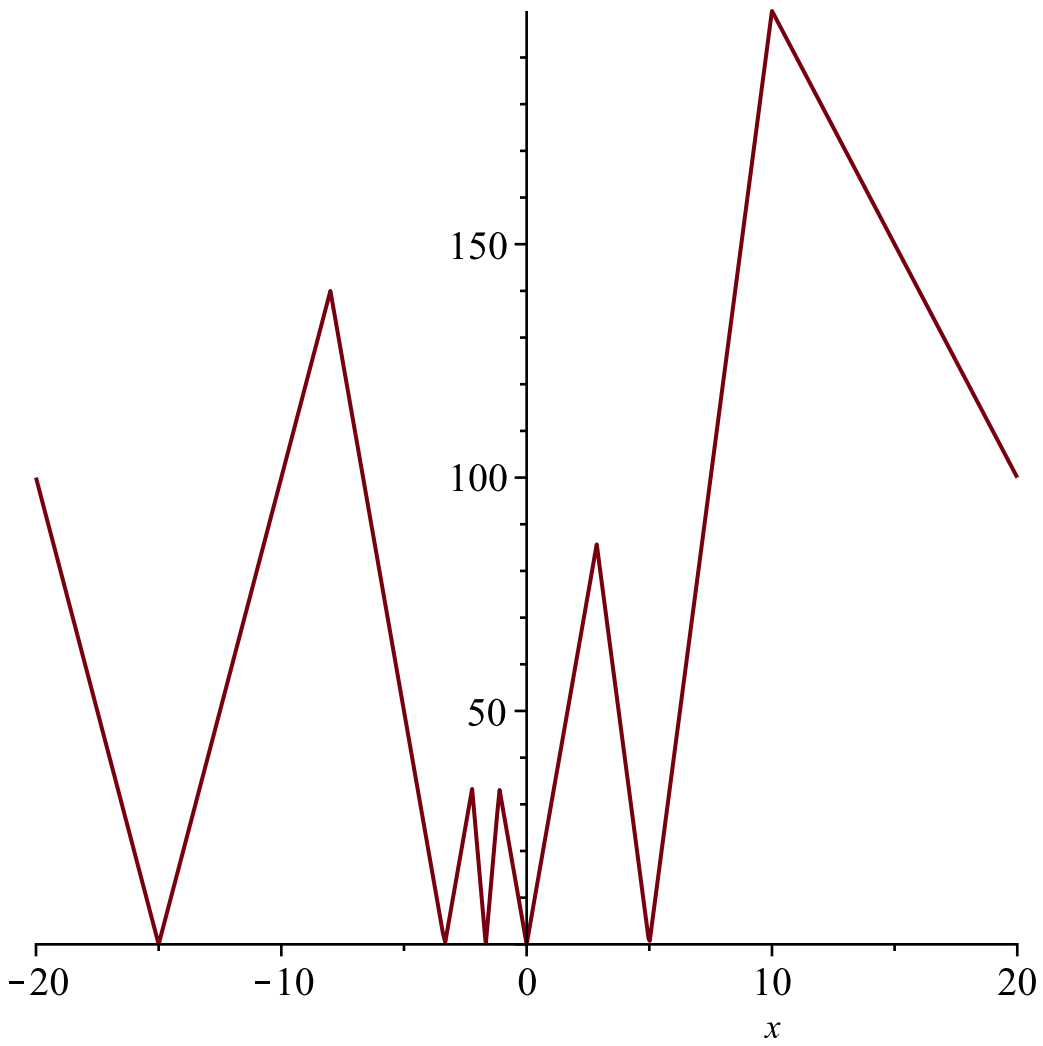
$$\frac{200}{3}$$

$$\frac{200}{3}$$

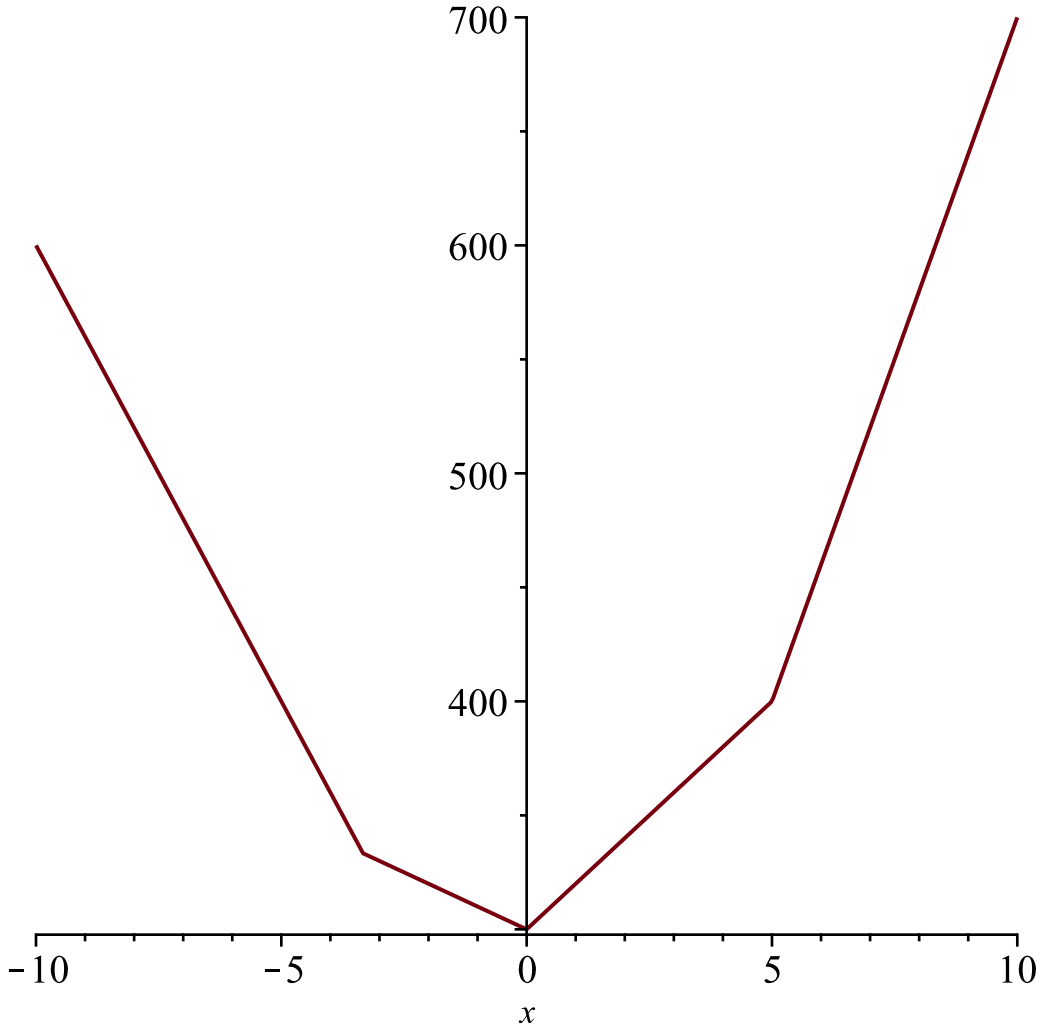
$$[114.285714280116693, [x = 9.99999999957143]]$$



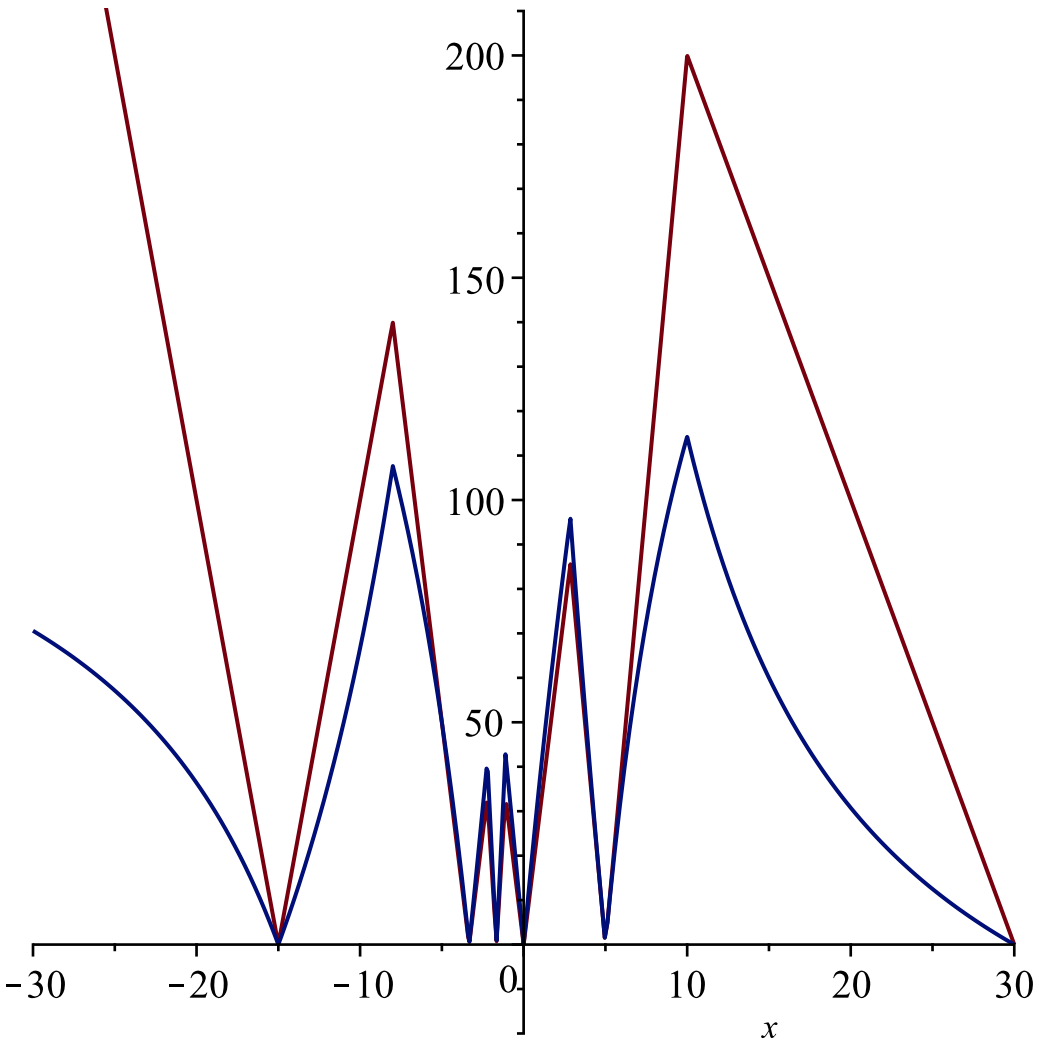

```
> plot(min(30 |x|, 10 |x − 30|, 40 |x − 5|, 20 |x + 15|, 20 |3 x + 5|, 10 |3 x + 10|), x = -20 ..20);
```



> $plot(\max(30\,x+100, 50\,x+400, 60\,x+100, 90\,x+200) - \min(30\,x+100, 50\,x+400, 60\,x+100, 90\,x+200))$




```
> plot([min(30 |x|, 10 |x − 30|, 40 |x − 5|, 20 |x + 15|, 20 |3 x + 5|, 10 |3 x + 10|),
  (400 min(30 |x|, 10 |x − 30|, 40 |x − 5|, 20 |x + 15|, 20 |3 x + 5|, 10 |3 x + 10|)) / (max(30 x
  + 100, 50 x + 400, 60 x + 100, 90 x + 200) − min(30 x + 100, 50 x + 400, 60 x + 100,
  90 x + 200))], x = −30 ..30, −20 ..210)
```


200
150
100
50
0
-30
-20
-10
10
20
30
x

>

>