Questão 01

```
> restart
> f:=x->(3*exp(x)-1)/(x-2)*ln((x^2+2*x+3)/(x^2-3))
```

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

Item (a)

```
> solve((x^2+2*x+3)/(x^2-3)>0)
```

$$\left(-\infty, -\sqrt{3}\right), \left(\sqrt{3}, \infty\right) \quad (2)$$

```
> x<>2
```

$$x \neq 2 \quad (3)$$

```
> solve(x^2-3<>0)
```

$$\left\{x \neq \sqrt{3}, x \neq -\sqrt{3}\right\} \quad (4)$$

Dom(f)=$\left(-\infty, -\sqrt{3}\right), \left(\sqrt{3}, \infty\right), x \neq 2$

Item (b)

```
> limit(f(x),x=2,left)
```

$$-\infty \quad (5)$$

```
> limit(f(x),x=2,right)
```

$$\infty \quad (6)$$

```
> limit(f(x),x=-sqrt(3),left)
```

$$\infty \quad (7)$$

```
> limit(f(x),x=sqrt(3),right)
```

$$-\infty \quad (8)$$

Assíntotas verticais:

```
> x=2;x=sqrt(3);x=-sqrt(3)
```

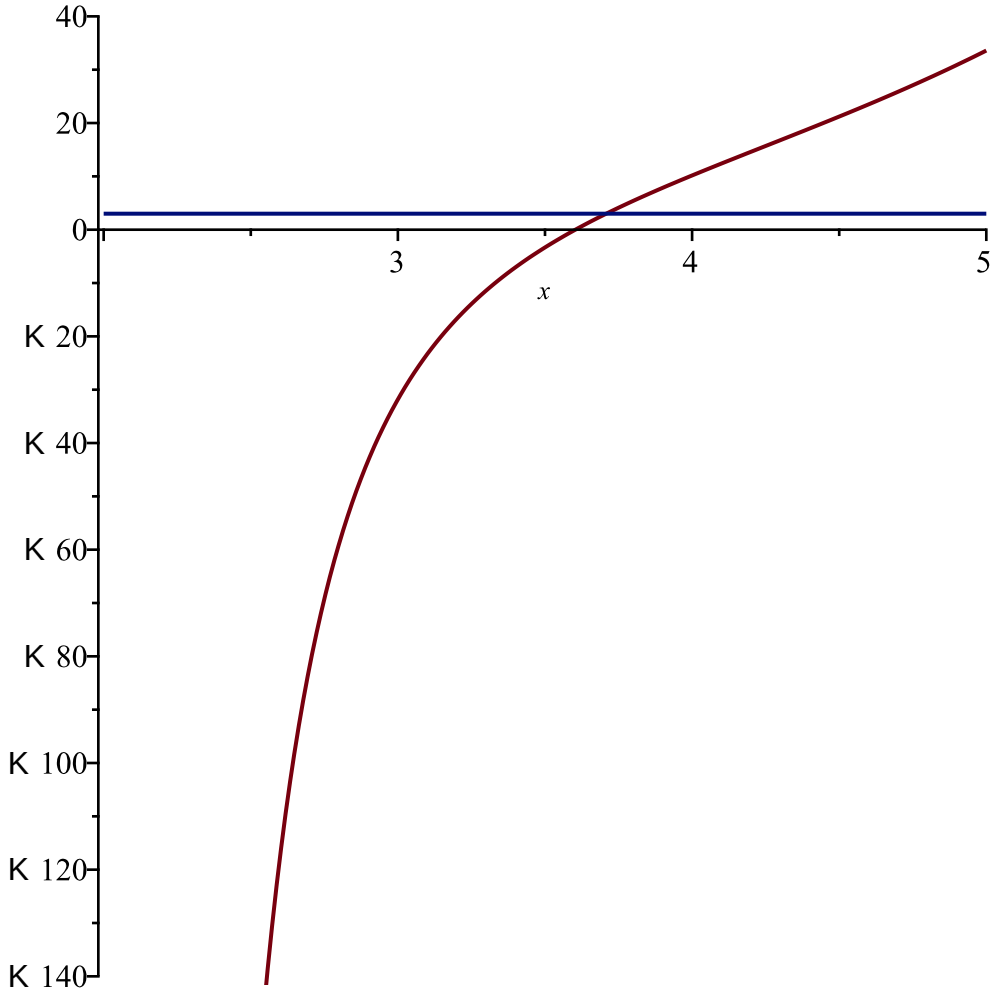
$$x = 2$$

$$x = \sqrt{3}$$

$$x = -\sqrt{3} \quad (9)$$

Item (c)

```
> plot([D(f)(x),3],x=2..5)
```

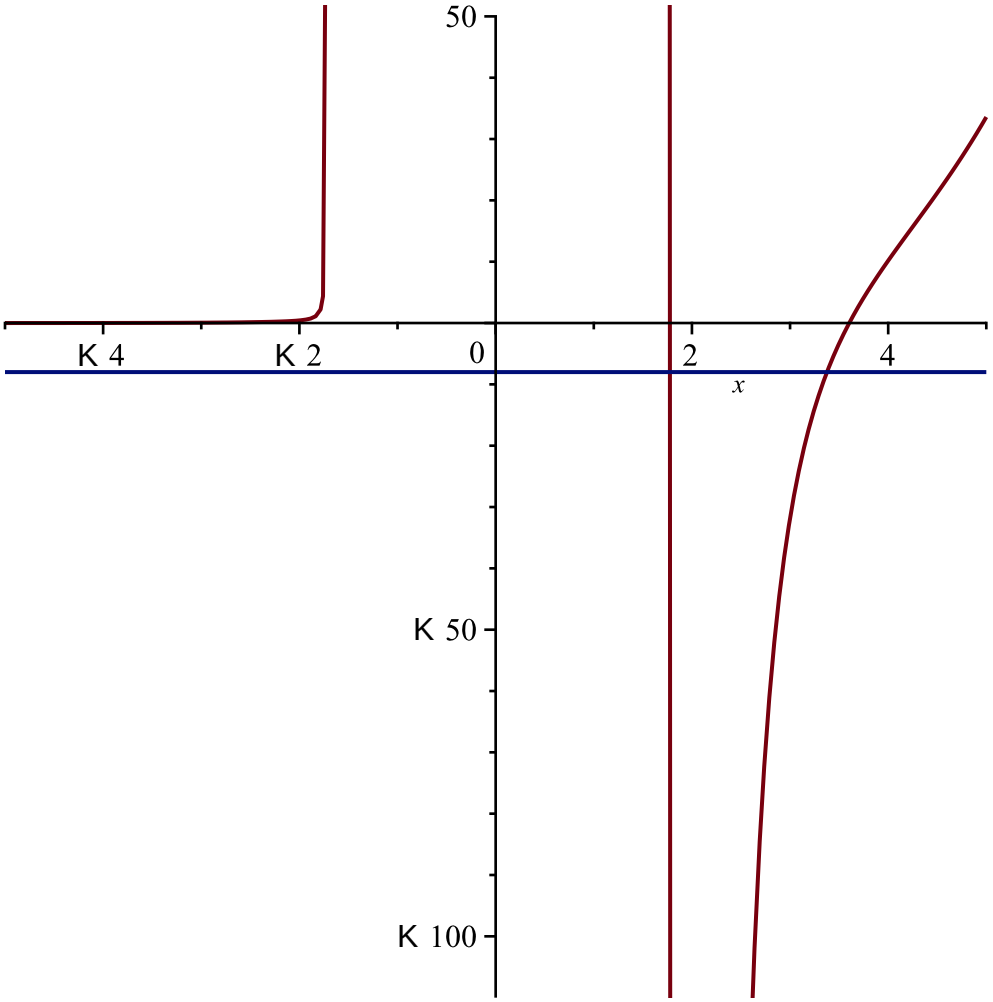



```
> x0:=fsolve(D(f)(x)=3,x=3..4)
```

$$x0 := 3.708059748 \qquad \textbf{(10)}$$

Item (d)

```
> plot([D(f)(x),-8],x=-5..5)
```




```
> x0:=fsolve(D(f)(x)=-8)
```

$$x0 := 3.376474973 \quad \textbf{(11)}$$

```
> f(x0)
```

$$58.23745044 \quad \textbf{(12)}$$

```
> y=D(f)(x0)*(x-x0)+f(x0)
```

$$y = \mathrm{K}\ 8.00000000\, x + 85.24925022 \quad \textbf{(13)}$$

Item (e)

```
> p:=x->a2*(x-3)^2+a1*(x-3)+a0
```

$$p := x \mapsto a2 \cdot (x \mathrm{K}\ 3)^2 + a1 \cdot (x \mathrm{K}\ 3) + a0 \quad \textbf{(14)}$$

```
> s:=fsolve([(D@@0)(f)(3)=(D@@0)(p)(3),(D@@1)(f)(3)=(D@@1)(p)(3),
  (D@@2)(f)(3)=(D@@2)(p)(3)])
```

$$s := \{a0 = 65.10004079,\ a1 = \mathrm{K}\ 31.82172703,\ a2 = 48.63689146\} \quad \textbf{(15)}$$

```
> evalf(subs(s,p(3.1)));f(3.1);evalf(subs(s,p(3.1)))-f(3.1)
```

$$62.40423700$$

$$62.36216327$$

$$0.04207373 \quad \textbf{(16)}$$

Falso, pois $0.04207373 > 10^{\mathrm{K}\ 2}$

Questão 02

Item (a)

```
> restart
```

```
> V:=r->Pi*r^2*h
```

$$V := r \mapsto \pi \cdot r^2 \cdot h \tag{17}$$

```
> s:=solve(V(r)=150,h)
```

$$s := \frac{150}{\pi r^2} \tag{18}$$

```
> h:=unapply(s,r)
```

$$h := r \mapsto \frac{150}{\pi \cdot r^2} \tag{19}$$

```
> C:=r->Pi*r^2*3+2*Pi*r*h(r)*2
```

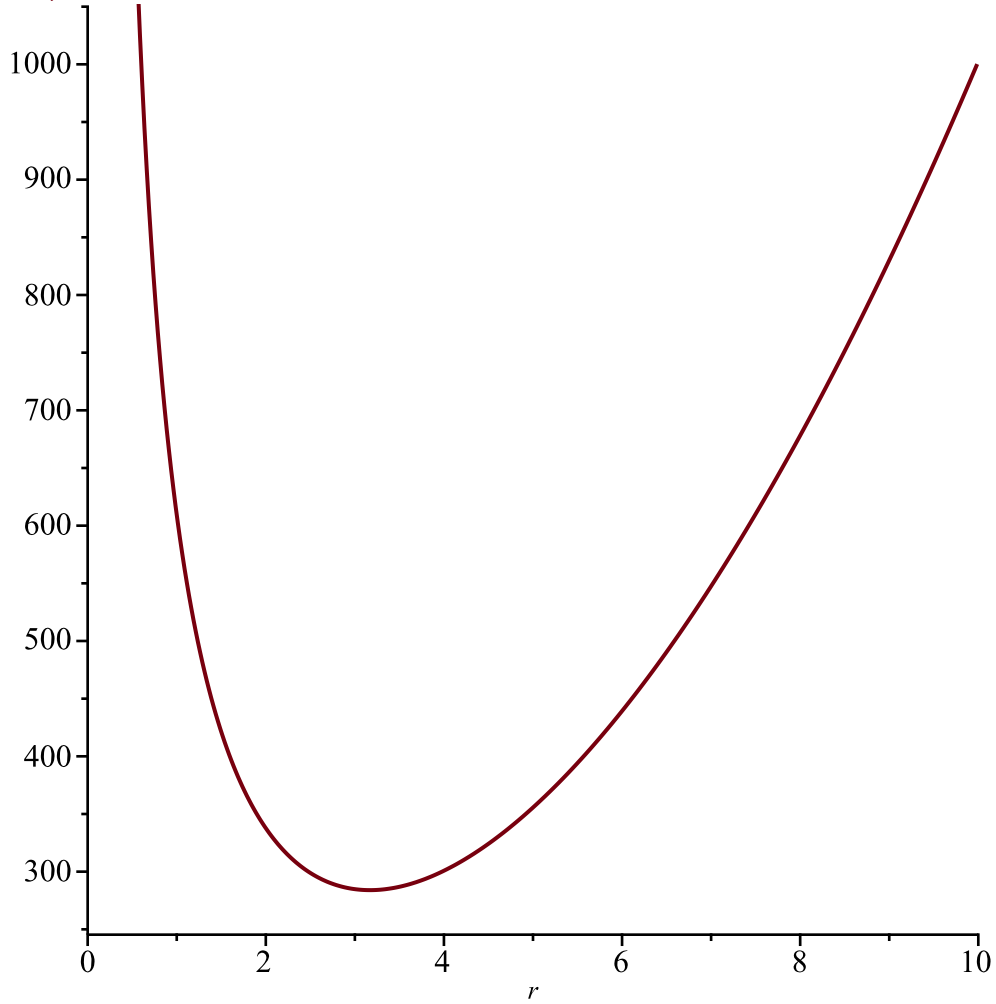
$$C := r \mapsto 3 \cdot \pi \cdot r^2 + 4 \cdot \pi \cdot r \cdot h(r) \tag{20}$$

```
> C(r)
```

$$3 \pi r^2 + \frac{600}{r} \tag{21}$$

Item (b)

```
> plot(C(r),r=0..10)
```




```
> rmin:=fsolve(D(C)(r)=0,r=2..4)
```

$$rmin := 3.169202884 \quad (22)$$

```
> hmin:=h(rmin)
```

$$hmin := 4.753804323 \quad (23)$$