1) Rekenwerk geeft:

$$y'' + y' - 2y = \underbrace{-2x^2 + 6x - 10}_{\text{bergparabool zonder nulpunten } (D<0)}$$

2) a) $N(0) = 8,905 \Rightarrow 8905$

b) $N'(t) = 45 \cdot e^{-0,005(t-18)^2} \cdot (-0,005 \cdot 2 \cdot (t-18))$

$= -0,45 \cdot e^{-0,005(t-18)^2} \cdot (t-18)$ STOP!

$N'(t) = 0 \Leftrightarrow (t-18) = 0 \Leftrightarrow t = 18$

$N(18) = 45$ dus 45000 besmettingen op $t = 18$ (6 november)

c) $N'(5) = 2,513$ dus 2513 besm/dag

d) $N'(t)$ is maximaal als $N''(t) = 0$

$N''(t) = -0,45 \cdot e^{-0,005(t-18)^2} - 0,45 \cdot e^{-0,005(t-18)^2} \cdot (-0,005) \cdot 2 \cdot (t-18) \cdot (t-8$

$= -0,45 e^{-0,005(t-18)^2} \cdot (1 - 0,01(t-18)^2)$

$N''(t) = 0 \Leftrightarrow 1 - 0,01(t-18)^2 = 0$

$\Leftrightarrow \frac{1}{0,01} = (t-18)^2$

$\Leftrightarrow 100 = (t-18)^2$

$\Leftrightarrow t - 18 = 10$ of -10

$\Leftrightarrow \underbrace{t = 28}_{\text{16 november}}$ of $\underbrace{t = 8}_{\text{27 oktober}}$

e) $\lim_{t \to \infty} N(t) = \lim_{t \to \infty} 45 \cdot e^{-0,005(t-18)^2} = 45 \cdot e^{-\infty} = 45 \cdot 0 = 0$

3) a) $f(x) = 7\,\mathrm{Bgtan}(x-1) + 3\ln(x-1) - \frac{1}{2}\ln(x^2-2x+2)$

$$\Rightarrow f'(x) = \frac{7}{1+(x-1)^2} + \frac{3}{x-1} - \frac{1}{2}\cdot\frac{2x-2}{(x^2-2x+2)}$$

$$= \frac{7}{x^2-2x+2} + \frac{3}{x-1} - \frac{x-1}{x^2-2x+2}$$

$$= \frac{8-x}{x^2-2x+2} + \frac{3}{x-1} = \frac{(8-x)\cdot(x-1)+3(x^2-2x+2)}{(x^2-2x+2)(x-1)}$$

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

b) $f'(x) = 0 \Leftrightarrow \underbrace{2x^2+3x-2=0}$

$D = 25$

$x_{1,2} = \frac{-3\pm5}{4} \begin{cases} \cancel{1/2} \\ \cancel{-2} \end{cases}$ zie domein!

Nee.

4) a) $\stackrel{H}{=} \lim\limits_{x\to\infty} \frac{e^x+\frac{1}{x}}{e^x+1} \stackrel{H}{=} \lim\limits_{x\to\infty} \frac{e^x - \frac{1}{x^2}}{e^x}$ → gaat naar 0

$$= \lim_{x\to\infty} \frac{e^x}{e^x} \quad \lim_{x\to\infty} \frac{1}{e^x\cdot x^2} = 1 - 0 = 1$$

b) $\lim\limits_{x\to0} \frac{\cos x - \ln(e+x)}{\sin x} \stackrel{H}{=} \lim\limits_{x\to0} \frac{-\sin x - \frac{1}{e+x}}{\cos x}$

$$= \frac{0-\frac{1}{e}}{1} = -\frac{1}{e}$$

5) a) <u>HA</u>: $y = 1$

$$\Rightarrow \lim_{x \to -\infty} \ln(e^{ax} + b) = 1 \quad \Rightarrow \ln(e^{-\infty} + b) = 1$$

$$\Rightarrow \ln(b) = 1$$

$$\Rightarrow b = e$$

<u>SA</u>: $y = 2x$

$$\Rightarrow 2 = \lim_{x \to \infty} \frac{\ln(e^{ax} + e)}{x} \overset{H}{=} \lim_{x \to \infty} \frac{\frac{e^{ax} \cdot a}{e^{ax} + e}}{1} = \lim_{x \to \infty} \frac{a^{\cancel{2}} \cdot \cancel{e^{ax}}}{\cancel{a} \cdot \cancel{e^{ax}}} = a$$

b) $f'(x) = 1 \Rightarrow \dfrac{e^{2x} \cdot 2}{e^{2x} + e} = 1$

$$\Rightarrow 2 \cdot e^{2x} = e^{2x} + e$$

$$\Rightarrow e^{2x} = e \quad \Rightarrow 2x = 1 \quad \Rightarrow x = \frac{1}{2}$$

6) $f(x) = x^{\frac{1}{x}} = e^{\frac{\ln x}{x}}$

$$f'(x) = e^{\frac{\ln x}{x}} \cdot \frac{\frac{1}{\cancel{x}} \cdot \cancel{x} - \ln x}{x^2} = \frac{\sqrt[x]{x} \cdot (1 - \ln x)}{x^2}$$

nulpunt: $x = e$
($\cancel{x = 0}$)

x		e	
$\sqrt[x]{x}$	+	+	+
$1 - \ln x$	+	0	−
x^2	+	+	+
$f'(x)$	+	0	−
$f(x)$	↗	MAX	↘

$f(x)$ is <u>maximaal</u> als $x = e$ en $f(e) = \sqrt[e]{e}$ zodat $\sqrt[x]{x} \leq \sqrt[e]{e}$