1. a) $\lim_{x\to 1} \frac{x^2+x-2}{2x^2+3x-5} \overset{L'H}{=} \frac{0}{0} = \lim_{x\to 1} \frac{2x+1}{4x+3} = \boxed{\frac{3}{7}}$

2. $\lim_{x\to 2} \frac{3\sqrt{x-1}-\sqrt{x^2+5}}{x-2} \overset{L'H}{=} \frac{0}{0} = \lim_{x\to 2} \frac{3}{2\sqrt{x-1}} - \frac{x}{\sqrt{x^2+5}} = \frac{3}{2} - \frac{2}{3} = \frac{9-4}{6} = \boxed{\frac{5}{6}}$

3. $\lim_{x\to\infty} \left(\frac{x^2-1}{x} - \frac{1-2x^2}{2x-1} \right) = \infty - (-\infty) = \infty + \infty = \boxed{\infty}$

4. $\lim_{x\to\infty} \frac{\ln(x-5)}{x-1} \overset{L'H}{=} \frac{\infty}{\infty} = \lim_{x\to\infty} \frac{1}{x-5} = \frac{1}{\infty} = \boxed{0}$

5. $\lim_{x\to\infty} \left(1+\frac{1}{x+2}\right)^{x-1} \overset{1^\infty}{=} e^{\lim_{x\to\infty} \frac{x-1}{x+2}} = e^1 = \boxed{e}$

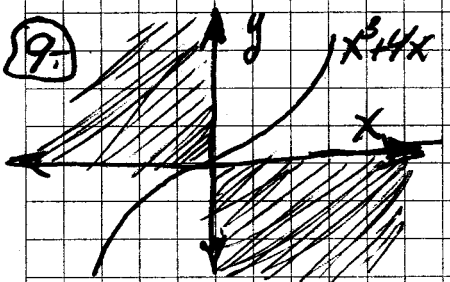
6. $\lim_{x\to 0} \frac{\operatorname{sen} x + \operatorname{tg} x}{1-\cos x} \overset{\text{Inf}}{=} \lim_{x\to 0} \frac{x+x}{\frac{x^2}{2}} = \lim_{x\to 0} \frac{1}{x}$ $\begin{cases} \lim_{x\to 0^-} \frac{1}{x} = \boxed{-\infty} \\ \lim_{x\to 0^+} \frac{1}{x} = \boxed{+\infty} \end{cases}$

7. $\lim_{x\to\infty} (\sqrt{x+1}-\sqrt{x+2}) \frac{\sqrt{x+1}+\sqrt{x+2}}{\sqrt{x+1}+\sqrt{x+2}} = \lim_{x\to\infty} \frac{x+1-x-2}{\sqrt{x+1}+\sqrt{x+2}} = \lim_{x\to\infty} \frac{-1}{\sqrt{x+1}+\sqrt{x+2}} = \frac{-1}{\infty} = \boxed{0}$

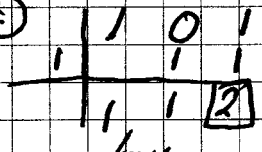
8. $\lim_{x\to\infty} (3x-\sqrt{9x^2+ax+1}) \frac{3x+\sqrt{9x^2+ax+1}}{3x+\sqrt{9x^2+ax+1}} = \lim_{x\to\infty} \frac{-ax-1}{3x+\sqrt{9x^2+ax+1}}$

$= \lim_{x\to\infty} \frac{-a-\frac{1}{x}}{3+\sqrt{9+\frac{a}{x}+\frac{1}{x^2}}} = \frac{-a}{6} = 2 \longrightarrow \boxed{a=-12}$

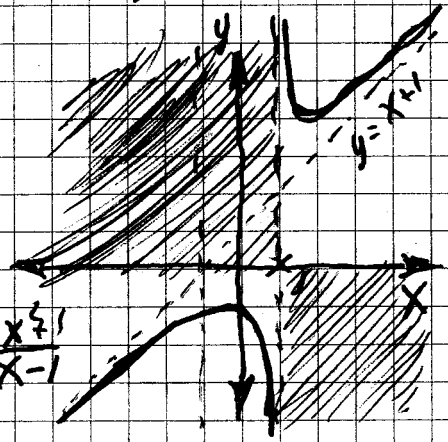
9.



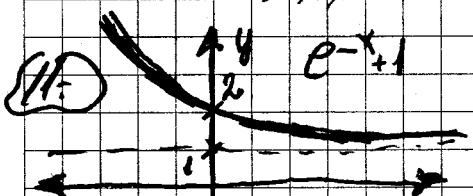
10.



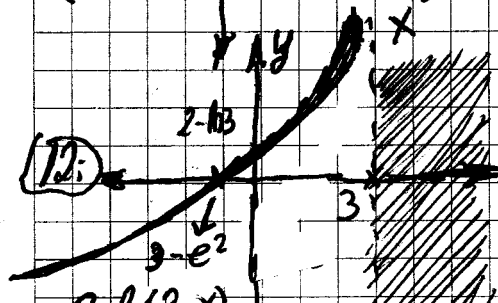
Asintota Oblicua



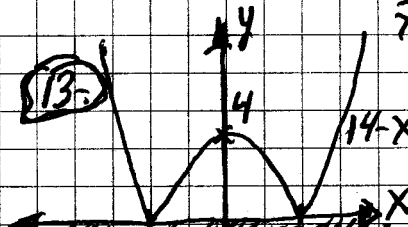
11.



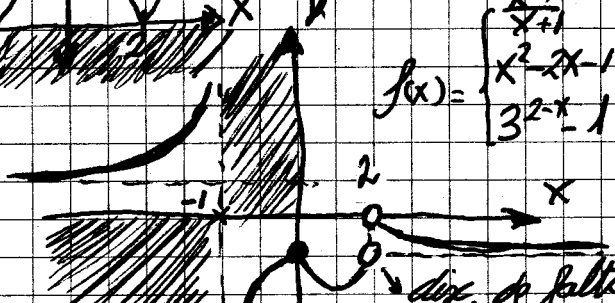
12.



13.



14.



$$f(x) = \begin{cases} \frac{x-1}{x+1} & x \le 0 \\ x^2-2x-1 & 0 < x \le 2 \\ 3^{2-x}-1 & x > 2 \end{cases}$$

dos de falta