**I-(1.5 points)**

Determine the domain of definition of the following function: $f(x) = \dfrac{\ln(x-2)}{x-3}$

**II-(5 points)**

Solve the following equations and inequality:

1) $\ln x + \ln 2 = \ln(x+1) - 2\ln 3$   2) $\ln^2 x + 3\ln x = 4$   3) $\ln(3x-1) - \ln(-x+1) \le \ln 2$

**III-(4.5 points)**

Calculate the following integrals:

1) $\displaystyle\int_1^2 \dfrac{-x+2}{x^2-4x+5}\,dx$   2) $\displaystyle\int_0^1 \dfrac{x^2-1}{(x^3-3x+3)^3}\,dx$   3) $\displaystyle\int_1^e \left(2x-1-\dfrac{\ln x}{x}\right)dx$

**IV-(4.5 points)**

Calculate the following limits:

1) $\displaystyle\lim_{x\to+\infty} \dfrac{x+2\ln x}{x}$   2) $\displaystyle\lim_{x\to+\infty} \left(2x-1-\ln^2 x\right)$   3) $\displaystyle\lim_{x\to 3} \dfrac{\displaystyle\int_3^x \ln(t+e-3)\,dt}{\ln(2x-5)}$

**V-(4.5 points)**

Consider the function $f$ defined over *IR* by: $f(x) = x^2 - 1$, and let (C) be its representative curve.

1) Set up the table of variations of $f$.
2) Solve the equation $f(x) = 0$ and draw (C).
3) Calculate the area of the domain limited by (C), the axis of abscissas and the lines with equations $x = -1$ *and* $x = 1$.
4) Calculate the area of the domain limited by (C), the axis of abscissas, the axis of ordinates and the line with equation $x = 2$.

*Good luck*