"Exponential Functions"

Name:………… 12-LS

I. <u>Part A:</u>

Consider the function g defined on $\mathbb{R}$ as $g(x) = (2 - x)e^x - 2$.

Denote by (G) its representative curve in an orthonormal system $(O;\ \vec{\imath}, \vec{\jmath})$.

1. Determine $\lim\limits_{x \to -\infty} g(x)$, and deduce an asymptote to (G).
2. Determine $\lim\limits_{x \to +\infty} g(x)$ and calculate $g(2)$.
3. Calculate $g'(x)$ and set up the table of variations of $g(x)$.
4. a. Show that the equation $g(x) = 0$ admits exactly two roots one of them is 0.

   b. Denote by α the second root of the equation $g(x) = 0$. verify that $1.58 < \alpha < 1.6$.

5. Copy and complete the table of sign of g.

x	$-\infty$		0		α		$+\infty$
$g(x)$			0		0		

6. Write the equation of tangent (T) to (G) at the origin O.
7. Draw (T) and (G).

<u>Part B:</u>

Consider the function f defined on $\mathbb{R}$ as $f(x) = \frac{e^x - 2}{e^x - 2x}$.

Denote by (C) its representative curve in an orthonormal system $(O;\ \vec{\imath}, \vec{\jmath})$.

1. Show that the lines of equations $y = 0$ and $y = 1$ are asymptote to (C).
2. Show that $f'(x) = \frac{2g(x)}{(e^x - 2x)^2}$,then set up the table of variations of f.
3. Prove that $f(\alpha) = \frac{1}{\alpha - 1}$.
4. Determine the points of intersection of (C) with:

   a. The axis of abscissas.

   b. The line of equation $y = 1$.

5. Draw (C).