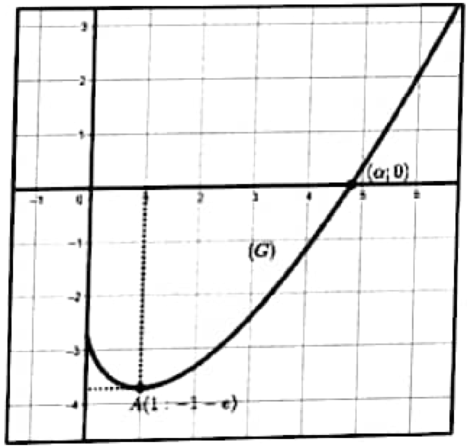
No.	Questions	Answers		
		a	b	c
1	Let f be a function defined over $\mathbb{R}$ by $f(x) = e^{-x+1}$, then the image of $[0; 1[$ is:	$]1; e]$	$[-e; 1[$	$[1; e[$
2	If A and B are two independent events with $P(B) = 0.2$ and $P(A) = 0.3$ then $P(A \cap \overline{B}) =$	0.24	0.34	0.4
3	Let f be a function defined over $\mathbb{R}$ of curve (C), by $f(x) = \frac{e^x-5}{e^x+1}$ its center of symmetry is	$I(0; -2)$	$I(0; -1)$	$I(0; 2)$

II -(5 points)

In the figure at right, we have:



- (G) is the representative curve of the function g defined on $]0; +\infty[$, by $g(x) = ax + b + x\ln x$, where a and b are two real numbers.
- (G) admits at the point $A(1; -1-e)$ a minimum

1) Find $g(1)$ and $g'(1)$

2) Show that $g'(x) = a + 1 + \ln x$,

   then deduce that $a = -1$ and $b = -e$.

3) Determine $\lim_{x\to+\infty} g(x)$ and set up the table of variations of g. (knowing $\lim_{x\to0^+} g(x) = -e$)

4)-a). Show that the equation $g(x) = 0$ admits a unique root α such that $4.7 < \alpha < 4.8$

b) Verify that $\ln\alpha = \frac{\alpha+e}{\alpha}$.

c) Study, in terms of α, the sign of $g(x)$.

d) B is point of the curve (G). Determine the coordinates of the point B where the tangent to (G) at the point B is parallel to the line (D) of equation (D): $y = x$

III- (5 points)

Consider two urns U and V. U contains **five** balls: 3 red and 2 white.

V contains **ten** balls: 4 red and 6 white.

1) We draw simultaneously and randomly, **three** balls from the urn V. Consider the following events:

A: « at least one of the three drawn balls is red ».

B: « among the three drawn balls, only two have the same color ».

a- Calculate p(A).

b- Show that p(B) =0.8

2) We choose randomly one of the two urns U and V, then we draw simultaneously and randomly **two** balls from the chosen urn. Consider the events:

E: « the chosen urn is U ». F: « the two drawn balls have the same color ».

a- Show that P(F/E) =0.4 then deduce $P(F\cap E)$.

b-Calculate $P(F\cap \bar{E})$ then Deduce that $p(F) = \frac{13}{30}$.

c- The two drawn balls have different color. What is the probability that the two selected balls are from urn U?

3) Each red ball is numbered 2 and each white ball is numbered –1. We draw randomly **one** ball from the urn U and **two** balls simultaneously from the urn V.

Consider the event H: ‹‹ the sum of numbers shown on the three drawn balls is equal to zero ››.

Show that $p(H) = \frac{31}{75}$

IV- (7 points)

Part A: Consider the function g defined over $\mathbb{R}$ by $g(x) = x - 2 + 2e^x$ and let (C_g) be its representative curve in an orthonormal system $(O;\vec{i};\vec{j})$.

1. Calculate $\lim\limits_{x\to-\infty} g(x)$ and $\lim\limits_{x\to+\infty} g(x)$.
2. Study the variations of g over $\mathbb{R}$ and then set up its table of variations.
3. Calculate $g(0)$ then deduce the sign of $g(x)$ over $\mathbb{R}$.

Part B: Let f be a function defined over $\mathbb{R}$ by $f(x) = e^{2x} + (x-3)e^x$ and let (C_f) be its representative curve in an orthonormal system $(O;\vec{i};\vec{j})$.

1.Calculate $\lim\limits_{x\to-\infty} f(x)$ and $\lim\limits_{x\to+\infty} f(x)$. Deduce an asymptote to (C).

2.Show that $f'(x) = e^x \times g(x)$ and then set up the table of variations of f.

3.a. Show that over $]0;+\infty[$ the equation $f(x) = 0$ admits a unique solution α.

b. Show that $0.79 < \alpha < 0.8$.

4.Draw (C_f) in an orthonormal system.

5.Determine the domain of definition of the function h defined by: $h(x) = \ln[(f(x))]$

6.Set up the table of variations of h on its domain (without calculating limits)