Haret Hreik official high school
For boys
Class: Gr12-LS (B)
Name:

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Exponential

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Subject : Mathematics
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Extra sheet 4

Ex1

Solve in IR

1) $e^{-2x+3} = e^{x+6}$ **2)** $e^{x+1} = 1$ **3)** $-2e^{x} + 5 = 1$ **4)** $(2x-1)e^{x-1} = 0$

5) $3e^{2x} - e^{x} = 0$ **6)** $e^{2x} + 4e^{x} + 3 = 0$ **7)** $\ln(e^{x} + 2) = 2\ln 2$ **8)** $\frac{2}{e^{x}+1} = e^{x}$

Ex2

Calculate the derivative of each of the following functions

1) $f(x) = 2x - 1 + 2xe^{x}$ **2)** $f(x) = (2x+1)e^{x}$

3) $f(x) = \frac{2e^{x}}{e^{x}+1}$ **4)** $f(x) = \frac{x-e^{x}}{1-e^{x}}$

Ex3

Calculate the following limits

1) $\lim_{x\to+\infty}(x - 2 - 3e^{x})$ **2)** $\lim_{x\to+\infty}\left(\frac{e^{x}-1}{e^{x}+1}\right)$ **3)** $\lim_{x\to-\infty}\left(\frac{e^{x}+1}{x}\right)$

4) $\lim_{x\to0^{+}}\left(\frac{e^{x}}{e^{x}-1}\right)$ **5)** $\lim_{x\to-\infty}(x+1)e^{-x}$ **6)** $\lim_{x\to+\infty}(2x+1)e^{-x}$

Ex4

Consider the function f defined over IR by $f(x) = (x-1)e^{x}$ and designate by (C) its representative curve in an orthonormal system $(O;\vec{i},\vec{j})$.

1) Calculate $\lim_{x\to-\infty} f(x)$ and $\lim_{x\to+\infty} f(x)$.Deduce an asymptote to (C).
2) Determine the points of intersection of (C) with the axes of coordinates.
3) Calculate $f'(x)$ and set up the table of variations of f.
4) Draw (C).

Ex5

Consider the function f defined over IR by $f(x) = x + 1 + e^{x}$ and designate by (C) its representative curve in an orthonormal system $(O;\vec{i},\vec{j})$.

1) Calculate $\lim_{x\to+\infty} f(x)$.
2) Determine the coordinates of the point of intersection of (C) and the y-axis.
3)
- **a)** Calculate $\lim_{x\to-\infty} f(x)$ and deduce that $(d): y = x + 1$ is an asymptote to (C) at $-\infty$.
- **b)** Show that (d) is below (C).

4) Calculate $f'(x)$ and set up the table of variations of f.
5) Write an equation of the tangent (T) to (C) at its point of abscissa 0.
6) Verify that $f(x) = 0$ admits over IR a unique root α and that $-1.3 < \alpha < -1.2$
7) Draw (T) and (C).

Ex6

The plane is referred to an orthonormal system$(O;\vec{i},\vec{j})$. **(Unit: 2 cm).**

Part A

Let g be the function defined over $\mathbb{R}$ by $g(x) = 1 + (-x + 1)e^{-x}$.

1) Set up the table of variation of g

2) Deduce that $g(x) > 0$ for every value of x.

Part B

Consider the function f defined over $\mathbb{R}$ by: $f(x) = x + 1 + xe^{-x}$.

Designate by (C) the representative curve of f

1) Calculate $\lim\limits_{x\to-\infty} f(x)$ and $f(-1)$.

2)

a) Calculate $\lim\limits_{x\to+\infty} f(x)$

b) Show that the straight line (D) of equation $y = x + 1$ is an asymptote to (C) at $+\infty$.

c) Study according to the values of x the relative position of (D) and (C).

3) Verify that $f'(x) = g(x)$, and set up the table of variation of f.

4) Show that the tangent (T) to (C) at $A(1\,;\,2 + \frac{1}{e})$ is parallel to (D).

5) Show that the equation $f(x) = 0$ admits over IR a unique solutionα and then verify that $-0.5 < \alpha < -0.4$

6) Draw (D), (T) and (C).

Ex7

The plane is referred to an orthonormal system$(O;\vec{i},\vec{j})$.

Part-A

Let h be the function defined over IR by $h(x) = (2 - x)e^{x} - 2$. Designate by (H) its representative curve.

1) Calculate $\lim\limits_{x\to-\infty} h(x)$ and $\lim\limits_{x\to+\infty} h(x)$, deduce an asymptote to (H).

2) Calculate $h'(x)$ and set up the table of variations of h.

3) The equation $h(x) = 0$ admits over IR two roots 0 and α, show that $1.5 < \alpha < 1.6$.
Deduce the sign of h(x).

Part-B

Consider the function f defined over IR by $f(x) = \frac{e^{x}-2}{e^{x}-2x}$ and designate by (C) its representative curve.

1) Calculate $\lim\limits_{x\to-\infty} f(x)$ and $\lim\limits_{x\to+\infty} f(x)$, deduce the asymptotes to (C).

2) Determine the coordinates of the points of intersection of (C) and its asymptotes.

3) Show that $f(\alpha) = \frac{1}{\alpha-1}$.

4)

a) Show that $f'(x) = \frac{2h(x)}{(e^{x}-2x)^2}$ and deduce the sign of f'.

b) Set up the table of variations of f.(**Take α = 1.6**)

5) Trace (C) and its asymptotes.