Etablissement Inter – Etats d'Enseignement Supérieur
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END OF SEMESTER EXAM

JUNE 2022

Course Tittle : MATHS ANALYSIS

Duration :2h Level : I Branch : Software Engineering ACADEMIC YEAR : 2021/2022

INSRUCTION: ANSWER ALL QUESTIONS FROM BOTH SECTIONS

SECTION A : MULTIPLE CHOICE QUESTIONS

Write down just the letter which corresponds to the correct answer in your answer booklet

1. The domain of definition of the function $f(x) = \log(-2x + 10\,)$ is
   A. $Df: x \in \,]5 \quad +\infty[$
   B. $Df: x \in \,]-5 \quad +\infty[$
   C. $Df: x \in \,]-\infty \quad 5[$
   D. $Df: x \in \,]5 \quad -\infty[$

2. The domain of definition of the function $f(x) = \sqrt{\frac{2x-1}{-x+2}}$ is
   A. $Df: x: x \in [{}^{1}/_{2} \quad 2[$
   B. $Df: x: x \in [{}^{1}/_{2} \; -2[$
   C. $\{{}^{1}/_{2} \leq x < 2\}$
   D. A and C

3. The domain of definition of the function $f(x) = \log|2x + 3|$
   A. $Df: x: x \in \,]-\infty \quad -{}^{3}/_{2} \quad [u] \quad -{}^{3}/_{2} + \infty[$
   B. $Df: x: x \in \,]-\infty \quad -{}^{3}/_{2} \quad [u] \quad {}^{3}/_{2} + \infty[$
   C. $Df: x: x \in \,]-\infty \quad {}^{3}/_{2} \quad [u] \quad -{}^{3}/_{2} + \infty[$
   D. $Df: x: x \in \,]-\infty \quad -{}^{3}/_{2} \quad [u] - -{}^{3}/_{2} + \infty[$

4. Evaluating $\lim_{x \to 0} \left[\frac{2x - x^2}{2x}\right]$ gives
   A. 0
   B. 2
   C. 1
   D. -1

5. The vertical asymptote of the function $f(x) = \frac{2x}{x-1}$ is
   A. $x = -1$
   B. $x = 1$
   C. $x \leq -1$
   D. $x \geq 1$

6. The horizontal asymptote of the function $f(x) = e^{-x}$ is
   A. $y = \infty$
   B. $y =$ -
   C. $y = 0$
   D. $y \leq 0$

7. What is the parity of the function $f(x) = x^2 + 2x - 1$
   A. Even
   B. Odd
   C. Odd and even
   D. Neither odd nor even

8. The parity of the function $f(x) = \ln\left(\frac{1+x}{1-x}\right)^{1/2}$ is
   A. Odd
   B. Even
   C. Neither odd nor even
   D. None of the above

9. Solving the differential equation $y = (x+1)\frac{dy}{dx} = 1 - y$ given that $y = -3$ when $x = 0$
   A. $y = \frac{x-3}{x-1}$
   B. $y = \frac{x-3}{x+1}$
   C. $y = \frac{x-1}{x+3}$
   D. $y = \frac{x-1}{x-3}$

10. The particular solution to the differential equation $e^x\frac{dy}{dx} = 4$
    A. $y = 7 + 4e^{-x}$
    B. $y = 7 - 4e^{x}$
    C. $y = 4e^{-x} - 7$
    D. $y = 7 - 4e^{-x}$

SECTION B: STRUCTURAL QUESTIONS

INSTRUCTIONS: SHOW ALL STEPS IN YOUR CALCULATIONS

1. Differentiate the following with respect x:
   a) $y = (1 + 3x^2)^4$
   b) $y = e^{f(x)}$
   c) $h(x) = a^{1-2x}$ {1.5mks}

2. Fid the following limit development
   a) $e^{x^{x-x^2}} - \log(1-x) - 1$ in the neighborhood of 0
   b) $(\cos x)^5$ in the neighborhood of 0
   c) $f(x) = (1+x)^{\alpha}$ $(\alpha \epsilon R)$ In the neighborhood of 1

3. Solve the following using integration by parts
   a) $\int (x^2 - 3x)e^{2x}\,dx$
   b) $\int xsinxdx$ { 3mks}

4. Solve the following using integration using change of variable $\int \frac{2x^2}{\sqrt{x^3-1}}$ {1.5mk}

5. Find the general solution of the following differential equations giving your answer in the form $y = f(x)$

a) $\frac{dy}{dx} = \tan^{-1}x$

b) $(1 - x^2)\frac{dy}{dx} = \frac{x+3}{x+2}$ (2mks)

The end!!!

Course Master: Mr Ekiti