

Class: first year FCI Subject: Mathematics.(2)

Final Examination Cod:MA102



Time: 2 hours Jun.: 8/6/2023

[Total Marks: 60

Answer the following questions:

(1) (a) Express $\frac{4x}{x^3-x^2-x+1}$ in partial fraction $(x^2+1+2x)(x+1)$

(b) Resolve into partial fraction $\frac{2x}{x^2+2x-3}$.

(2)(a) Determine if the series convergence or divergence:

$$\sum_{n=0}^{\infty} \frac{n!}{5^n}$$
 , $\sum_{n=0}^{\infty} \frac{n^2 - 1}{10 + 5n^2}$

(b) Does the infinite series $\sum_{k=2}^{\infty} \frac{2}{k^2-1}$ have a limiting sum? If so, what is its value?

(c) Determine the radius of convergence and interval of convergence for the power series $\sum_{n=0}^{\infty} \frac{(x-2)^n}{n5^n}$.

(3) Solve the following differential equations:

(i)
$$y(2x-1)dx + (x^2-x)dy$$
.

(ii)
$$\frac{dy}{dx} = \frac{x^3 + 3y^3}{xy^2}.$$

(iii)
$$(2x + e^y)dx + xe^y dy = 0$$
.

(iv)
$$\frac{dy}{dx} - \frac{1}{x}y = x^2$$
.

(4) (a) Find the inverse of the matrix : $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, show that $A A^{-1} = I$.

(b) Find the eigenvalues and the eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}.$$

With my best wishes &

Prof.A.R.Shehata.



Class: second year FCI Subject: Mathematics (2) Code: MA102

Final Examination



Time: 2 hours Jan.:9/1/2020

Answer the following questions:

[Total Marks: 60]

- (1) (a) Express $\frac{4x}{x^3-x^2-x+1}$ in partial fraction.
- (b) Resolve into partial fraction $\frac{6x+7}{x^2-x-6}$.
 - (2) (a) Determine if the series converge or diverge:

$$\sum_{n=0}^{\infty} \frac{n!}{5^n}$$
 , $\sum_{n=0}^{\infty} \frac{4n^2-1}{10+5n^2}$.

(b) Determine the radius of convergence and interval of

convergence for the power series
$$\sum_{n=1}^{\infty} \frac{(-1)^n n}{4^n} (x+3)^n.$$

- (3) Solve the following differential equations:
 - (i) $x\cos y dx e^{-x} \sec y dy = 0$.

(ii)
$$\frac{dy}{dx} = \frac{x+y-1}{x-y+1}.$$

(ii)
$$\frac{dy}{dx} = \frac{1}{x - y + 1}$$
.
(iii) $(e^{x + y} + ye^y)dx + (xe^y - 1)dy = 0$.

(iii)
$$(e^{x} + yc)$$
 $= cosx$.
(iv) $\frac{dy}{dx} + (cotx)y = cosx$.

(4) (a) Solve the equations using the inverse matrix method:

(4) (a) Solve the equations using the
$$3x + 2y = 5$$
.
 $5x + y = 13$, $3x + 2y = 5$.

(b) Find the eigenvalues and the eigenvectors of the matrix

(b) Find the eigenvalues and the 2
$$A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$$
.

With my best wishes&

Dr.A.R.Shehata.



Class: First year FCI
Subject: Mathematics (2)
Code:MA102
:BMA113
Final Examination



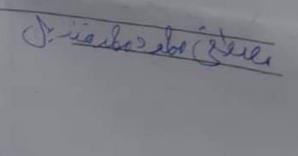
Time: 2 hours Jun.:30/1/2022

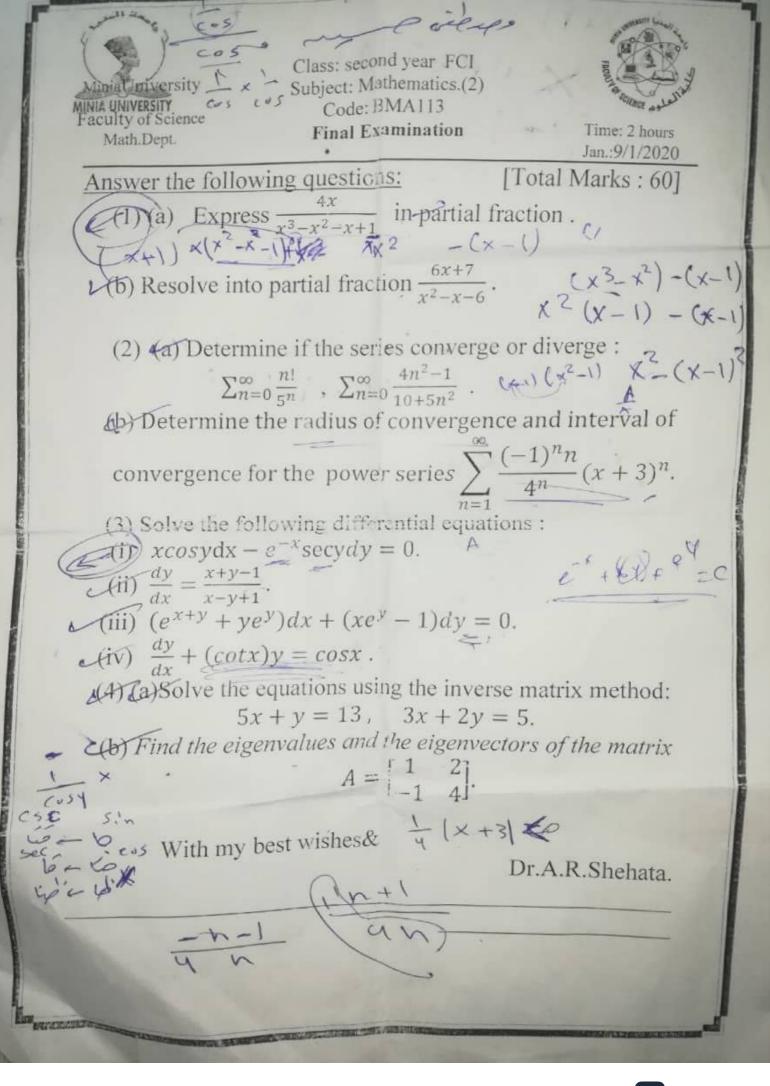
nswer the following questions:

[Total Marks: 60]

- (1) (a) Express $\frac{x^2+3x-1}{(x+1)(x^2+2)}$ in partial fraction.
- (b) Resolve into partial fraction $\frac{6x+7}{r^2-x-6}$.
 - (2) (a) Determine if the series converge or diverge: $\sum_{n=0}^{\infty} \frac{n!}{6^n} , \sum_{n=0}^{\infty} \frac{3n^2-1}{10+5n^2}.$
 - (b) Determine the radius of convergence and interval of convergence for the power series $\sum_{n=1}^{\infty} \frac{2^n}{n} (4x 8)^n.$
 - (3) Solve the following differential equations:
 - (i) 2xdy = ydx.
 - (ii) $\frac{dy}{dx} = \frac{x^3 + 3y^3}{xy^2}$.
 - (iii) $(2x + y^2)dx + 2xydy = 0$.
 - (4) (a) Solve the equations using the inverse matrix method: 3x + 2y = -2, x + 4y = 6.
 - (b) Find the eigenvalues and the eigenvectors of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

Best Wishes & Dr. Abd El Rahman Statuta

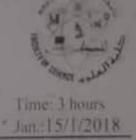






Class: second year FCI Subject: Mathematics.(2) Code: BMA113

Final Examination



Answer the following questions:

[Total Marks: 60]

- (1) (a) Express $\frac{x+3}{x(x-1)^2}$ in partial fraction.
- (b) Resolve into partial fraction $\frac{x-13}{x^2+2x-3}$.
- (2)(a) Determine if the sequences converge or diverge:

$$\left\{\frac{3n^2-1}{10n+5n^2}\right\}_{n=2}^{\infty}$$
, $\{(-1)^n\}_{n=0}^{\infty}$.

(b) Determine if the series converge or diverge:

$$\sum_{n=0}^{\infty} \frac{n!}{3^n}$$
, $\sum_{n=0}^{\infty} \frac{4n^2-1}{10+5n^2}$

- (3) Solve the following differential equations:
- (i) 2xdy = y(x+1)dx.
- (ii) $\frac{dy}{dx} = \frac{x^2 + 3y^2}{xy}.$
- (iii) $(e^{x+y} + ye^y)dx + (xe^y 1)dy = 0.$
- (iv) $\frac{dy}{dx} + (\cot x)y = \cos x$.
- (4) (a) Solve the equations using the inverse matrix method: 5x + y = 13, 3x + 2y = 5.
- (b) Find the eigenvalues and the eigenvectors of the matrix

$$A = \begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix}.$$

With my best wishes&

Dr.A.R.Shehata.

Answer the following questions:

[Total Marks: 60]

- (1) (a) Express $\frac{2x}{x^4-1}$ in partial fraction.
- (b) Resolve into partial fraction $\frac{7x-23}{x^2-7x+12}$.
- (2)(a) Graph the sequences:

$$\left\{\frac{n+1}{n^2}\right\}_{n=1}^{\infty}$$
, $\left\{\frac{(-1)^{n+1}}{2^n}\right\}_{n=0}^{\infty}$.

(b) Determine if the series convergence or divergence :

$$\sum_{n=1}^{\infty} \frac{n}{3^n}$$
, $\sum_{n=0}^{\infty} \frac{n^2 - 1}{10 + 5n^2}$

- (3) Solve the following differential equations:
- (i) 2xdy = ydx.

(ii)
$$\frac{dy}{dx} = \frac{x^3 + 3y^3}{xy^2}.$$

- (iii) $(2x + y^2)dx + 2xydy = 0$.
- (iv) $\frac{dy}{dx} \frac{1}{x}y = x^2$.
- (4) (a) Find the inverse of the matrix : $A = \begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix}$,

show that $A A^{-1} = I$.

(b) Find the eigenvalues and the eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}.$$

With my best wishes&

Dr.A.R.Shehata.