Mid-Term Exam

Allowed time: 2 hours

Calculators are not permitted

1. Find the elements of the conic section of equation $4x^2 + 9y^2 - 8x - 36y + 4 = 0$, [4] then sketch it.

2. Find the standard equation of the hyperbola with focci $(2,3)$, $(-6,3)$ and the [4] distance between its two vertices equals to 6, then sketch it.

3. Calculate, whenever it is possible, $2A - B^T$ and AB, for matrices [4]

$$A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & 3 & -2 \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & 2 \\ 0 & 1 \\ -1 & 3 \end{pmatrix}.$$

4. Consider the system of linear equations

$$\begin{cases} 2x + y + z &= 1 \\ x - y &= 0 \\ y - z &= 3 \end{cases}$$

   (a) Solve this system by using Cramer' rule. [4]

   (b) Solve this system by using Gauss elimination method. [4]

5. Evaluate the integrals

   (a) $\displaystyle\int \frac{4x^3 + 1}{\sqrt{x^4 + x + 1}} \, dx.$ [2]

   (b) $\displaystyle\int (x + 1)e^{x^2 + 2x} \, dx.$ [2]

   (c) $\displaystyle\int (2x + 1)\cos x \, dx.$ [3]

   (d) $\displaystyle\int (2x + 1)\ln x \, dx.$ [3]

١٠٤ ريض

ريّاضيّات عامّة (2)

كلّية العلوم ـ قسم الرّياضيّات

الفصل الأوّل ١٤٤٣ ه

جـــامـــعـــة الملك سعود

King Saud University

1957

Mid-Term Exam

Allowed time: 2 hours

Calculators are not permitted

1. Find the elements of the conic section of equation $y^2 - 2y + 4x = 3$, then sketch it. [4]

2. Find the standard equation of the ellipse with vertices at $(-4, 2)$, $(6, 2)$ and one of [4]
   its two focci at $(5, 2)$, then sketch it.

3. Calculate, whenever it is possible, the products $2AB$ and BA of matrices [4]

$$A = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 1 & 0 \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & -1 \\ 0 & 1 \\ 2 & 1 \end{pmatrix}.$$

4. Consider the system of linear equations

$$\begin{cases} x - 2y + z & = & 4 \\ -x + 2y + z & = & -2 \\ 2x - 3y - z & = & 3 \end{cases}$$

   (a) Solve this system by using Cramer' rule. [4]

   (b) Solve this system by using Gauss elimination method. [4]

5. Evaluate the integrals

   (a) $\int (3x - 1)\sqrt{3x^2 - 2x + 1} \; dx.$ [2]

   (b) $\int (5x + 4)^5 \; dx.$ [2]

   (c) $\int x^3 \ln x \; dx.$ [3]

   (d) $\int \dfrac{3\cos(3x) + 2\sin(2x)}{\sin(3x) - \cos(2x)} \; dx.$ [3]

١٠٤ ريض

رياضيّات عامّة (2)

كليّة العلوم ـ قسم الرّياضيّات

الفصل الثّاني ١٤٤٢ ه

جـــامــعـــة الملك سعود
King Saud University
1957

Mid-Term Exam

Allowed time: 2 hours

Calculators are not permitted

1. Find the elements of the conic section of equation $y^2 - 4x^2 + 6y - 32x - 59 = 0$, [5] then sketch it.

2. Find the standard equation of the parabola of focus $F(-1, -2)$ and directrix of [4] equation $y = 0$, then sketch it.

3. Calculate the product AB of matrices [3]

$$A = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 4 \end{pmatrix}, \qquad B = \begin{pmatrix} 0 & -4 & 1 \\ 1 & 0 & 2 \\ -2 & 1 & 0 \end{pmatrix}.$$

4. Consider the system of linear equations

$$\begin{cases} x + y + z = 9 \\ x - y + z = 3 \\ x + y - z = 1 \end{cases}$$

   (a) Solve this system by using Cramer' rule. [4]
   (b) Solve this system by using Gauss-Jordan elimination method. [4]

5. Evaluate the integrals

   (a) $\int 10x^3 \left(x^4 + 1\right)^{\frac{3}{2}} \ dx.$ [2]

   (b) $\int 4x \cos(2x) \ dx.$ [2]

   (c) $\int \dfrac{\frac{1}{x}}{2 + \ln x} \ dx.$ [2]

   (d) $\int x \sec^2 x \ dx.$ [4]

Mid-Term Exam

Allowed time: 2 hours

Calculators are not permitted

1. Find the elements of the conic section of equation $9x^2 + 4y^2 + 18x - 16y - 11 = 0$ and then sketch it. [5]

2. Find the standard equation of the hyperbola of focci $F_1(6, 2), F_2(-4, 2)$ and one of its vertices $V(5, 2)$, then sketch it. [4]

3. Calculate the product AB of matrices [3]

$$A = \begin{pmatrix} 1 & -2 & 2 \\ 2 & -1 & 2 \\ 2 & -2 & 3 \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & 2 & -2 \\ -2 & -1 & 2 \\ -2 & -2 & 3 \end{pmatrix}.$$

4. Consider the system of linear equations

$$\begin{cases} x + y + z &= 2 \\ x - y + 2z &= 3 \\ 2x + z &= 3 \end{cases}$$

   (a) Solve this system by using Cramer' rule. [4]

   (b) Solve this system by using Gauss-Jordan elimination method. [4]

5. Evaluate the integrals

   (a) $\displaystyle\int 18x^2(x^3 + 1)^5 \, dx.$ [2]

   (b) $\displaystyle\int 4xe^{2x} \, dx.$ [3]

   (c) $\displaystyle\int \frac{x}{\sqrt{2x^2 + 1}} \, dx.$ [2]

   (d) $\displaystyle\int \frac{3x + 5}{(x - 1)(x + 3)} \, dx.$ [3]

First Mid-Term Exam

Allowed time: 90min

Calculators are not permitted

[4]   1. Let $A = \begin{pmatrix} 1 & 2 \\ -1 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 2 & 0 \\ 2 & 0 & -2 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 1 \\ 0 & 1 \\ 1 & 1 \end{pmatrix}$. Compute (if possible):

         (i) $A + BC$,   (ii) $AB + C$

[5]   2. Compute the determinant $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 1 & 2 \\ 1 & 1 & 1 \end{vmatrix}$.

[6]   3. Solve by Gauss elimination method the system of linear equations

$$\begin{cases} x - y + z &= 2 \\ 2x - y - 3z &= 1 \\ 3x - 2y - 4z &= 1 \end{cases}$$

[5]   4. Find the elements of the following conic section and then sketch it.

$$4x^2 - 9y^2 - 8x + 36y + 4 = 0.$$

[5]   5. Find the standard equation of the ellipse with foci $F_1(2,3)$ and $F_2(2,-5)$ and vertex $V_1(2,4)$ and then sketch it.

Second Mid-Term Exam

Allowed time: 90min

Calculators are not permitted

1. Evaluate the integrals:

[2]   (a) $\int (e^x + x)^3 (e^x + 1) dx$;

[2]   (b) $\int x \cos \left(x^2 \right) dx$;

[3]   (c) $\int x \cos(x) \; dx$;

[3]   (d) $\int x^3 \ln(x) \; dx$;

[2]   (e) $\int \dfrac{3x^2 + 2}{x^3 + 2x + 2} \; dx$;

[3]   (f) $\int \dfrac{3x}{(x+1)(x-2)} \; dx$.

[1]   2. (a) Sketch the region $\mathcal{R}_1$ bounded by the curves

$$y = x^2 + 2, \qquad y = 3x.$$

[4]   (b) Find the area of the region $\mathcal{R}_1$ described in part (a).

[1]   3. (a) Sketch the region $\mathcal{R}_2$ bounded by the curves

$$y = 4 - x^2, \qquad y = 0, \qquad x = 1.$$

[4]   (b) Find the volume of the solid generated by rotating the region $\mathcal{R}_2$ in part (a) about the $y-$axis.