This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

# Stage Exam 06

## 13JUN2024 and 14JUN2024

Do NOT write in this box. Your MARK will be placed here.

| | |
|---|---|
| Subject : | Maths |
| Class : | 11S |
| Teacher : | Taline Hawatian |
| Duration : | 1 hour |

| | | |
|---|---|---|
| Your name : | | *Time taken to complete exam* |
| Your Class : | | |
| Exam Room : | | |
| How many sheets, including cover sheet : | | |

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

I.- (9 points)

Calculate the following integrals:

1) $\int sin^2 3x dx$ 2) $\int \frac{tan^2 x - 3tanx}{cos^2 x} dx$ 3) $\int x.\sqrt[4]{x^2+6}\, dx$

II.- (3 points)

Calculate the sum $S = 1 + \frac{1}{3} + \frac{1}{9} + \cdots + \frac{1}{3^{10}}$.

III.- (8 points)

Given the sequence $(u_n)$ defined by: $\begin{cases} u_0 = 2 \\ u_{n+1} = \frac{1}{4}u_n - 3, \quad n \epsilon N \end{cases}$

Let $v_n = 2u_n + 8$.

1) Calculate the exact values of $u_1$ and $u_2$.
2) Show that $(v_n)$ is a geometric sequence whose common ratio and first term $v_0$ are to be determined.
3) Calculate $v_n$ in terms of n.

   Deduce that $u_n = 6\left(\frac{1}{4}\right)^n - 4$.
4) Study the sense of variations of $(v_n)$.
5) Calculate $v_0 + v_1 + v_2 \ldots + v_8$.
6) Calculate the limit of $u_n$ at $+\infty$.

III.- (8 points)

Consider in the space of an orthonormal system $(O; \vec{i}; \vec{j}; \vec{k})$, the points $A(-1; 0; 0)$, $B(1; 1; -1), C(0; 1; 2)$, and $D(2; 2; 1)$.

1) Show that the points A, B, C, and D are coplanar.
2) Calculate $\overrightarrow{AB}.\overrightarrow{AC}$ and determine the angle $(\overrightarrow{AB}, \overrightarrow{AC})$ to the nearest degree.
3) Calculate the coordinates of the vector product $\overrightarrow{BC} \times \overrightarrow{BD}$.
4) Calculate the area of triangle $BCD$. Deduce the distance from C to $[BD]$.
5) Calculate the values of $m$ and $n$ so that $\vec{n}(2, 2m + 1, 3n)$ is normal to the plane $(BCD)$.

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## 13JUN2024 and 14JUN2024

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| | |
|---|---|
| Subject : | History |
| Class : | 9E |
| Teacher : | Mr. Asmar |
| Duration : | 1 hour |

| | | |
|---|---|---|
| Your name : | | *Time taken to complete exam* |
| Your Class : | | |
| Exam Room : | | |
| How many sheets, including cover sheet : | | |

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## أجب عن الأسئلة التّالية:

**1- شهد لبنان خلال الحرب العالميّة الأولى سنة 1914 أزمة اقتصاديّة حادّة.**

أ- إشرح اثنين من أسباب هذه الأزمة، ذاكرًا نتيجتين من نتائجها. **(علامتان)**

ب- أذكر اثنتين من محاولات معالجة الأزمة. **(علامة)**

**2- أعلن الجنرال غورو قيام دولة لبنان الكبير.**

أ- متى وأين تمّ إعلان دولة لبنان الكبير. **(علامة)**

ب- أذكر اثنين من المكاسب التي عرفتها دولة لبنان الكبير [جغرافيّة – بشريّة]. **(علامة)**

ج- أوضح اثنين من التّنظيمات الإداريّة التي عرفتها دولة لبنان الكبير. **(علامة)**

**3- أقرّ المجلس التّمثيليّ الثّانيّ (التّأسيسيّ) الدّستور اللبنانيّ سنة 1926.**

أ- ممّن تألّفت اللّجنة التي ساهمت في صياغة الدّستور اللبنانيّ [إسمان فقط]. **(علامة)**

ب- عرّف بشارل دبّاس، واذكر اثنين من إنجازات عهده. **(علامتان)**

**4- المعاهدة اللبنانيّة – الفرنسيّة سنة 1936.**

أ- أذكر اثنين من مضمونها [بنود المعاهدة]. **(علامة)**

ب- ما كان مصيرها. **(علامتان)**

**5- حقّق لبنان استقلاله السّياسيّ نتيجة توافق قياداته الوطنيّة.**

أ- عرّف الميثاق الوطنيّ، وبيّن اثنين من مبادئ هذا الميثاق. **(علامتان)**

ب- إشرح أربع خطوات استقلاليّة اتّخذتها حكومة رياض الصّلح. **(علامتان)**

ج- أذكر بالتّحديد تاريخ نيل لبنان إستقلاله. **(علامة)**

**6- طبّق الإنتداب البريطانيّ في فلسطين سياسة داعمة للحركة الصّهيونيّة.**

أ- عرّف الحركة الصّهيونيّة. **(علامة)**

ب- أذكر اثنين من الإجراءات [مظاهر السّياسة] التي طبّقتها بريطانيا في فلسطين. **(علامتان)**

SE06/2023 2024/ Maths/ 11S

I.- 1) $\int \sin^2 3x\,dx = \int \frac{1-\cos 6x}{2}\,dx = \frac{1}{2}\left(x - \frac{\sin 6x}{6}\right) + c$ (1.5)

$= \frac{1}{2}x - \frac{\sin 6x}{12} + c$ (1.5)

2) $\int \frac{\tan^2 x - 3\tan x}{\cos^2 x}\,dx$ let $u = \tan x$

$du = \frac{1}{\cos^2 x}\,dx$ (1)

$= \int (u^2 - 3u)\,du$

$= \frac{u^3}{3} - \frac{3u^2}{2} + c = \frac{\tan^3 x}{3} - \frac{3\tan^2 x}{2} + c$ (1) (1)

3) $\int x\sqrt[4]{x^2+6}\,dx$ let $u = x^2+6$ (1)

$du = 2x\,dx \quad \frac{1}{2}du = x\,dx$

$= \frac{1}{2}\int \sqrt[4]{u}\,du$

$= \frac{1}{2}\int u^{\frac{1}{4}}\,du = \frac{1}{2}\left(\frac{4}{5}u^{5/4}\right) + c$ (1)

$= \frac{2}{5}(x^2+6)\sqrt[4]{x^2+6} + c$ (1)

II.- $S = 1 + \frac{1}{3} + \frac{1}{9} + \cdots + \frac{1}{3^{10}}$

$u_0 = 1 \qquad r = \frac{1}{3}$ (1)

$S_{11} = u_0 \frac{1-r^{11}}{1-r} = 1 \cdot \frac{1-\left(\frac{1}{3}\right)^{11}}{1-\frac{1}{3}} \simeq 1.5$ (2)

III.- $\begin{cases} u_0 = 2 \\ u_{n+1} = \frac{1}{4}u_n - 3 \end{cases}$ $\qquad v_n = 2u_n + 8$

1) $u_1 = \frac{1}{4}u_0 - 3 = \frac{1}{4}(2) - 3 = -\frac{5}{2}$ 0.5

$u_2 = \frac{1}{4}u_1 - 3 = \frac{1}{4}\left(-\frac{5}{2}\right) - 3 = -\frac{29}{8}$ 0.5

2) $v_{n+1} = 2u_{n+1} + 8$

$= 2\left(\frac{1}{4}u_n - 3\right) + 8$

$= \frac{1}{2}u_n - 6 + 8 = \frac{1}{2}u_n + 2 = \frac{1}{4}(2u_n + 8)$

$= \frac{1}{4}v_n$ 1.5

$\frac{v_{n+1}}{v_n} = \frac{\frac{1}{4}v_n}{v_n} = \frac{1}{4}$ 0.5 $\quad v_0 = 2u_0 + 8 = 2(2) + 8 = 12$

$\Rightarrow (v_n)$ is a geometric sequence of common ratio $\frac{1}{4}$ and 1st term $v_0 = 12$.

3) $v_n = v_0 r^n = 12\left(\frac{1}{4}\right)^n$ 1

$v_n = 2u_n + 8 \qquad u_n = \frac{v_n - 8}{2} = \frac{1}{2}\left[12\left(\frac{1}{4}\right)^n\right] - 4$

$u_n = 6\left(\frac{1}{4}\right)^n - 4$ 0.5

4) $v_n = 12\left(\frac{1}{4}\right)^n \qquad v_0 = 12 \quad v_0 > 0$

$r = \frac{1}{4} \quad 0 < r < 1$

$\Rightarrow (v_n)$ is a decreasing sequence. 1

5) $v_0 + v_1 + \dots + v_8 = S_9 = v_0 \dfrac{1-(\frac{1}{4})^9}{1-\frac{1}{4}}$

$= 12\left(\frac{4}{3}\right)\left[1-\left(\frac{1}{4}\right)^9\right]$ 1

$\simeq 16.$ 0.5

6) $\lim\limits_{n\to+\infty} u_n = \lim\limits_{n\to+\infty} 6\left(\frac{1}{4}\right)^{n+0} - 4 = -4$ 1

IN $A(-1,0,1)$ $B(1,1,-1)$ $C(0,1,2)$ $D(2,2,1)$

1) $\vec{AB}(2,1,-1)$ $\vec{AC}(1,1,2)$ $\vec{AD}(3,2,1)$

$\vec{AB} = m\vec{AC} + n\vec{AD}$

$\begin{cases} 2 = m+3n \\ 1 = m+2n \\ -1 = 2m+n \end{cases}$ $+\ \begin{cases} m+3n=2 \\ \ominus m \ominus 2n = \ominus 1 \end{cases}$

$n = 1$ $\quad m = -1$ 2

Checking $2m+n = 2(-1)+1 = -1$ verified

2) $\vec{AB}\cdot\vec{AC} = 2(1)+1(1)+(-1)(2) = 1$ 0.5

$\cos(\vec{AB},\vec{AC}) = \dfrac{\vec{AB}\cdot\vec{AC}}{\|\vec{AB}\|\times\|\vec{AC}\|} = \dfrac{1}{\sqrt{4+1+1}\cdot\sqrt{1+1+4}} = \dfrac{1}{6}$ 1

$(\vec{AB},\vec{AC}) = 80°$

3) $\vec{BC}\times\vec{BD} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -1 & 0 & 3 \\ 1 & 1 & 2 \end{vmatrix}$ $\quad \vec{BC}(-1;0;3)$ $\quad \vec{BD}(1;1;2)$

$= -3\vec{i} - (-2-3)\vec{j} + (-1)\vec{k}$ 1

$= -3\vec{i} + 5\vec{j} - \vec{k}$ $\quad \vec{BC}\times\vec{BD}(-3,5,-1)$

4) $\mathcal{A}_{\Delta BCD} = \frac{1}{2} \|\vec{BC} \times \vec{BD}\|$

$= \frac{1}{2}\sqrt{9+25+1} = \frac{\sqrt{35}}{2}\ u^2$ 1

$\mathcal{A}_{\Delta BCD} = \frac{\text{height} \times \text{base}}{2}$

$\mathcal{A}_{\Delta BCD} = \frac{CH \times BD}{2}$ 1

$\frac{\sqrt{35}}{2} = \frac{CH \times \sqrt{6}}{2}$ $\quad CH = \frac{\sqrt{35}}{\sqrt{6}} = \frac{\sqrt{210}}{6}\ u$

5) $\vec{BC} \times \vec{BD}(-3, 5, -1)$ $\quad \vec{n}(2, 2m+1, 3n)$

$\vec{n}$ and $\vec{BC} \times \vec{BD}$ have the same direction.

$\frac{x}{x'} = \frac{y}{y'} = \frac{z}{z'}$ $\quad \frac{2}{-3} = \frac{2m+1}{5} = \frac{3n}{-1}$ 0.5

$\frac{2m+1}{5} = \frac{2}{-3}$ $\quad \frac{3n}{-1} = \frac{2}{-3}$

$-6m - 3 = 10$ 0.5 $\quad -9n = -2$ 0.5

$m = \frac{-13}{6}$ $\quad n = \frac{2}{9}$