AMERICAN UNIVERSITY OF BEIRUT

EXAM.: MATH 204

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SEC......1.........2.........3...

orrectors only

Grade of Written Part	Grade of Multiple Choice	Final Exam.. Grade
I II III IV V	Number of Correct:.......x 5=.......... Number of Wrong :.......x(-1)=......... Total M.C. Grade=.......................	

Instructions:

1. Write your name and circle your section number.
2. The colored booklet is for scratch work and will not be corrected.

PART ONE :   MULTIPLE CHOICE : Circle your answer. The choice E is for non of the other options.
You will receive five points for each correct and lose one point for each wrong answer.

During a commercial break, a television station is to pass four ads , from a list of 10 distinct available ads.
Answer questions :1-2-3

1. In how many ways can this be done if the order in which the ads are aired counts?
   A. 4050   B. 4800   C. 5040   D. 3040   E.

2. In how many ways can this be done if the order in which the ads are aired is not relevant?
   A. 210   B. 420   C. 640   D. 240   E.

3 . In how many ways can this be done if the order in which the ads are aired is not relevant, but one ad is repeated twice?
   A. 560   B. 660   C. 360   D. 460   E.

Given that 30% of the people in an undeveloped country are illiterate. Eight persons are randomly selected from the population of the country. Answer questions 4- 5–6 .
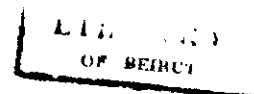
4.. What is the probability that two persons are illiterate?
   A.   0.404   B.   0.296   C.   0.368   D.   0.741

5..What is the mean number of illiterate persons expected to be?
   A.   2.1   B.   1.4   C.   2.7   D.   2.4

6.What is the standard deviation of the number of illiterate persons?
   A. 1.474   B. 2.491   C. 1. 296   D. 2.512

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Given the matrix $A = \begin{pmatrix} 6 & 5 & -3 \\ -3 & 2 & 1 \\ 0 & 3 & 4 \end{pmatrix}$. Answer questions 7 - 8 - 9

7. The determinant of A is.....
   A. 117   B. 135   C. 147   D. 120

8. The cofactor of a_{23} is .....
   A. 24   B. -18   C. 14   D. -14

9. The first row of the matrix product $A \times A$ is .....
   A. (-6,-21,19)   B. (6   21   -19)   C. (-5,13,-19)   D. (21,31,-25)

Given $f(x, y) = x^2 y e^{3x+2y}$. Answer questions 10 – 11

10. Find $f_y(2,1)$
   A. $12e^5$ B. $14e^5$ C. $12e^8$ D. $9e^8$ E.

11. Find $f_{yx}(1,1)$
   A. $15e^5$ B. $5e^5$ C. $12e^8$ D. $14e^8$ E.

A normal variable X (giving the test scores), has a mean of 625 and a standard deviation of 20.Answer questions 12– 13

12. P(X<654) = ...
   A. 0.4265   B. 0.9265   C. 0.2324   D. 0.7234   E.

13. Find k so that P(X<k) =0.33
   A. 616.2   B. 900.7   C. 617.4   D. 622.0   E.

Given the matrices $A = \begin{pmatrix} 2 & x \\ -3 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 3 \\ 2 & -6 \end{pmatrix}$. Answer questions 14 – 15

14. Find x if $A \times B = \begin{pmatrix} 8 & 12 \\ -5 & -39 \end{pmatrix}$
   A. 4   B. - 2   C. - 1   D. 3   E.

15. Find x if $A + 2B = \begin{pmatrix} 12 & 6 \\ 1 & -7 \end{pmatrix}$.
   A. 10   B. -7   C. - 4   D. 0   E.

16. If $y = f(u) = u^2$, and $u = g(x) = 7x - 2, then \dfrac{dy}{dx}$ at $x = -3$ $will\ be$:
   A. -322   B. 145   C. - 201   D. 34   E.

Of the 100 cars in a parking lot, 30 are black and 24 are of the AWD (all wheel drive) type, and 6 are black and AWD. Answer questions 17 and 18:

17. Find the probability that a randomly selected car is black or AWD.
   A. 0.84   B. 0.28   C. 0.36   D. 0.48   E.

18.What is the probability that an AWD car is black?
   A. 0.55   B. 0.25   C. 0.35   D. 0.15   E.

PART TWO: (Written)

I. (20 Points) **Consider the definite integral** $I = \int_0^8 x^2 e^{\frac{x}{2}} dx$ .Answer questions 1 - 2

1. Approximate the integral using the <u>trapezoidal</u> rule with n=4.

2. Approximate the integral using <u>Simpson's</u> rule with n=4.

II. (32 Points)Evaluate every integral in the space provided for it ,and circle your final result. Write down all important steps.

1. $I = \int (x+10)e^{-2x}\,dx$

2. $J = \int_0^3 (4x+60)\sqrt{x^2+30x+1}\,dx$

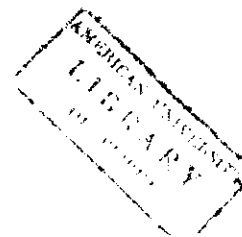3. $K = \int \dfrac{(e^{-5x} - 1)dx}{e^{-5x} + 5x - 7}$

4. $L = \int \dfrac{(4x - 16)dx}{(x - 4)(x + 2)}$

III. (24 Points)   1.   Find the area in the first quadrant , limited above by y=4 -3x and below by
the curve y=x^2 .

2.   Find the volume of the solid of revolution generated when the region between the function
$f(x) = \dfrac{(2 + \ln x)}{\sqrt{x}}$ and the x-axis ($for\, 1 \le x \le e$) is rotated about the x-axis.

IV.(14 Points) **Given that** $\dfrac{dy}{dx} = f'(x) = 12(x + \dfrac{(\ln x)^2}{x})$, *with* $f(1) = 12.$ *Find* $f(e^2).$

V.(20 Points).   **Determine the location and nature of all critical points of the function :**
$$f(x, y) = 74 + x^3 + y^2 - 48x - 3y$$