نماذج الاختبارات الشهرية

تجميع :

نور الجفري & فاطمة عاشور

HADHRAMOUT UNIVERSITY
COLLEGE OF COMPUTERS & INFORMATION TECHNOLOGY

Academic year:	2020/2021	**Test:**	mid exam
Day and Date:	Sunday13 .6/2021	**Level:**	First
Examiner:	Mr. Awad Bin Jobah	**Department:**	IT
Time Allowed:	1:15 Hour	**Subject:**	Integral Calculus

27 / 30

Question 1: (5+5=10 Marks)

(a) Use finite approximation to estimate the area under the graph of the function $f(x) = 4 - x^2$ between $x = 2$ and $x = -2$ using an upper sum with four rectangles of equal width

(b) Find the derivative of the following function $y = \int_{\sin x}^{1} (\frac{1}{1+t^2}) dt$

Question 2:(5+ 5= 10Marks)

(a)Suppose that $\sum_{k=1}^{10} a_k = 15$ and $\sum_{k=1}^{10} b_k = 10$ Find $\sum_{k=1}^{10} (2a_k - 3b_k + 7)$

(b) Write $(1 \cdot 2) + (3 \cdot 4) + (5 \cdot 6) + (7 \cdot 8)$ as sigma notation

$\sum_{k=1}^{4} (2k-1) * 2k$

Question 3 (2+2+2 =6 Marks)

Evaluate the following integrals

(a) $\int \sqrt{1 - \sin x}\, dx$ (b) $\int \frac{2\sin^2 x + \cos 2x}{\cos^2 x} dx$ (c) $\int_0^3 \sqrt{6x - x^2}\, dx$ (by using the graph)

Question 4:(4 Marks)

Use the definition of definite integral to evaluate the following integral $\int_0^2 (2x^2 + 1)\, dx$

End of Questions

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Best of luck

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$\frac{17}{20}$

Academic year:	2019/2020	**Test:**	First
Day and Date:	sunday,16 /2/2020	**Level:**	First
Examiner:	Mr. Awad Bin Jobah	**Department:**	IT
Time Allowed:	1 Hour	**Subject:**	Integral Calculus

Question 1: (5 Marks)

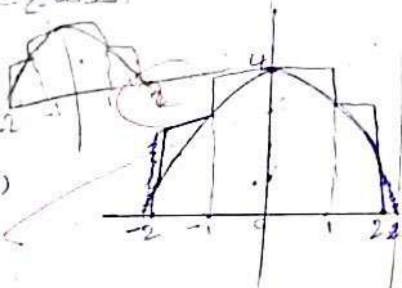
Use finite approximation to estimate the area under the graph of the function $f(x) = 4 - x^2$ between $x = 2$ *and* $x = -2$ using an upper sum with four rectangles of equal width

Solution:-

$f(-1) = 4-(-1)^2 = 3$
$f(0) = 4-0 = 4$
$f(1) = 4-1^2 = 3$
$f(-2) = 4-(-2)^2 = 0$
$f(2) = 4-2^2 = 0$

$f(-1)=3$, $f(0)=4$, $f(1)=3$
$(3\cdot1)+(4\cdot1)+(4\cdot1)+(3\cdot1) = 14$

The upper sum is $A = (1\times3)+(1\times4)+(1\times3)+(1\times0)+(1\times0)$
$= 3+4+3 = 10$



Question 2:(3+ 2= 5 Marks)

(a)Suppose that $\sum_{k=1}^{10} a_k = 5$ *and* $\sum_{k=1}^{10} b_k = 10$ Find $\sum_{k=1}^{10}(2a_k - 3b_k+4)$

(b) Write $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots - \frac{1}{50}$ as sigma notation Solution:-

$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots - \frac{1}{50} = \sum_{k=1}^{50} (-1)^{k+1} \cdot \frac{1}{k}$ 2

Question 3: (2+2+2 =6 Marks)

Evaluate the following integrals

(a) $\int(3x^2 - \sqrt{x} + 7)dx$

$= \int(3x^2 - x^{\frac{1}{2}} + 7)dx$
$= \frac{3x^3}{3} - \frac{2}{3}x^{\frac{3}{2}} + 7x + C$
$= x^3 - \frac{2}{3}x^{\frac{3}{2}} + 7x + C$

2

(b) $\int(\sin 5x + \sec^2 3x)\,dx$

$= -\frac{\cos 5x}{5} + \frac{\tan 3x}{3} + C$

2

(c) $\int(x+1)(x-1)\,dx$

Solution:- $\int(x+1)(x-1)dx$
$= \int(x^2-1)dx$
$= \frac{x^3}{3} - x + C$

2

Question 4: (4 Marks)

Use the definition of definite integral to evaluate the following integral $\int_0^2(2x+3)\,dx$

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Academic year: 2019/2020

Day and Date:	Sunday15 /3/2020	Test:	Second
Examiner:	Mr. Awad Bin Jobah	Level:	First
Time Allowed:	1 Hour	Department:	IT
		Subject:	Integral Calculus

2°

Question 1: (3+2=5 Marks)

(a) Find an upper bound and lower bound of the following integral : $\int_0^{\frac{\pi}{2}}(\sin x - \cos x)\,dx$

increasing

solutions- $f(x) = \sin x - \cos x \to f'(x) = \cos x + \sin x > 0 \;, \forall x \in [0, \frac{\pi}{2}]$

$\max(f) = \max(\sin x - \cos x) = (1-0) = 1$

$\min(f) = \min(\sin x - \cos x) = (0-1) = -1$

Since $\min(b-a) \le \int f(x)dx \le \max(b-a)$

Thus $-1(\frac{\pi}{2} - 0) \le \int_0^{\frac{\pi}{2}}(\sin x - \cos x)dx \le 1(\frac{\pi}{2} - 0)$

$\Rightarrow \quad -\frac{\pi}{2} \le \;\; '' \;\; \le \frac{\pi}{2}$

The upper bound is : $\frac{\pi}{2}$

the lower bound is : $\frac{-\pi}{2}$

3

(b) Verify the inequalities without evaluate the integral : $\int_1^3 \sqrt{2x^2+7}\,dx \ge 0$

Solutions- $f(x) = \sqrt{2x^2+7} \ge 0 \;. \forall x \in [1,3]$

Thus $\int_1^3 \sqrt{2x^2-7}\,dx \ge 0 \;. \forall x \in [1,3]$.

2

Question 2:(3+ 2= 5 Marks)

(a) Graph the integrands and use area to evaluate the following integral : $\int_{-2}^{4}(\frac{x}{2}+3)\,dx$

solutions-

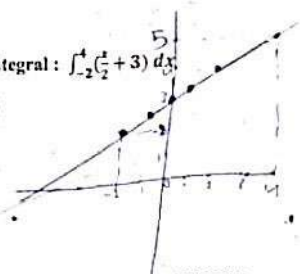
x	-2	-1	0	1	2
y	2	$\frac{5}{2}$	3	$\frac{7}{2}$	4

$y = (\frac{4}{2}+3) = 5$

$A = \frac{(3+2)}{2}\cdot 2 + \frac{(5+3)}{2}\cdot 4$

$= \frac{5}{2}\cdot 2 + \frac{8}{2}\cdot 4 = 5 + 16 = 21$

3



(b) Evaluate the following integrals : (1) $\int \frac{e^{\tan x}}{1-\sin^2 x}\,dx$ (2) $\int_0^{\frac{\pi}{2}} \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$

1

(1) $\int \frac{e^{\tan x}}{1-\sin^2 x}dx = \int \frac{e^{\tan x}}{\cos^2 x}dx = \int e^{\tan x}\cdot \sec^2 x\,dx$

Put $u = \tan x \Rightarrow du = \sec^2 x\,dx$ $\int e^{\tan x}\cdot \sec^2 x\,dx = \int e^u du = e^u + C$

$= e^{\tan x} + C$

(2) Put: $u = \sqrt{x} \Rightarrow du = \frac{1}{2\sqrt{x}}dx \Rightarrow 2du = \frac{1}{\sqrt{x}}dx$

$\int_0^{\frac{\pi}{2}} \frac{\cos\sqrt{x}}{\sqrt{x}}dx = 2\int_0^{\frac{\pi}{2}} \cos u\,du = 2\sin u \Big|_0^{\frac{\pi}{2}} = 2[\sin\frac{\pi}{2} - \sin 0] = 2(1-0)$

$= 2$

Question 3: (2+3 =5Marks)

(a) Find the derivative of the following function : $y = \int_0^{\tan x} \sqrt{1+t^2}\,dt$

solution:- $y' = \sqrt{1+\tan^2 x} \cdot \sec^2 x$

2

(b) Find the number C that satisfies the mean value theorem of the following integral : $\int_0^9 \sqrt{x}\,dx$

solution:- $av(f) = \frac{1}{9-0}\int_0^9 \sqrt{x}\,dx = \frac{1}{9}\cdot\int_0^9 x^{\frac{1}{2}}\,dx$

$= \frac{1}{9}\cdot\frac{2x^{\frac{3}{2}}}{3}\Big|_0^9 = \frac{2}{27}\cdot[(\sqrt{9})^3-(\sqrt{0})^3] = \frac{2}{27}\cdot[27-0] = \frac{2}{27}\cdot 27 = 2$

Thus $av(f) = 2$

Since $f(c) = av(f)$

thus $\sqrt{c} = 2 \Rightarrow c = 4 \in [0,9]$

3

Question 4: (5 Marks)

Find the area of the region bounded by the following curves $x = y^2$ *and* $x = y+2$

solution:- $x = y+2$

$0 = y+2 \Rightarrow y = -2$

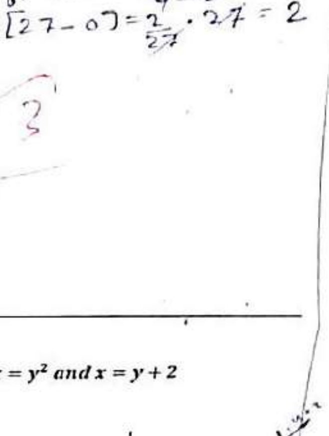
$x = 0+2 \Rightarrow x = 2$

$y^2 = y+2 \Rightarrow y^2-y-2=0$

$\Rightarrow (y+1)(y-2)=0$

$\Rightarrow y=-1$ and $y=2$

5



$A = \int_{-1}^{2}[(y+2)-y^2]\,dy = \int_{-1}^{2}(y+2-y^2)\,dy$

$= \frac{y^2}{2}+2y-\frac{y^3}{3}\Big|_{-1}^{2} = (2+4-\frac{8}{3})-(\frac{1}{2}-2+\frac{1}{3})$

$= (6-\frac{8}{3})-(-\frac{3}{2}+\frac{1}{3}) = \frac{10}{3}+\frac{7}{6} = \frac{20+7}{6} = \frac{27}{6} = \frac{9}{2}$

Q2 b 12 $u=\sqrt{x} \Rightarrow du = \frac{1}{2\sqrt{x}}dx \Rightarrow 2du = \frac{1}{\sqrt{x}}dx$

at $x = \frac{\pi}{2} \Rightarrow u = \sqrt{\frac{\pi}{2}}$

at $x = 0 \Rightarrow u = 0$

$\int_0^{\frac{\pi}{2}}\frac{\cos\sqrt{x}}{\sqrt{x}}\,dx = 2\int_0^{\sqrt{\frac{\pi}{2}}}\cos u\,du = 2\sin u\Big|_0^{\sqrt{\frac{\pi}{2}}} = 2[\sin\sqrt{\frac{\pi}{2}}-\sin 0] = 2\cdot\sin\sqrt{\frac{\pi}{2}}$

$= 0.0437$

1

End of Questions

Best of luck

نماذج الامتحانات النهائية

تجميع :
نور الجفري & فاطمة عاشور

HADHRAMOUT UNIVERSITY
COLLEGE OF COMPUTERS & INFORMATION TECHNOLOGY
FINAL EXAMINATION

Academic year:	2019/2020		
Day and Date	Tuesday, 22/9/2020	**Level:**	First
Examiner:	Mr. Awad Bin Jobah	**Department:**	IT موازي
Time Allowed:	1.30 Hour	**Subject :**	**Integral Calculus**

Question 1: (8+8+9 = 25Marks)

(a) Verify the formula by differentiation : $\int (7x+2)^3\,dx = \frac{(7x+2)^4}{28} + c$ $\qquad \frac{dy}{dx} =$

(b) Solve the initial value problem: $\frac{d^2y}{dx^2} = 2 - 6x \;;\quad y'(0) = 4\;;\; y(0) = 1$

(c)Evaluate the following integrals : (1) $\int \sin x \sec^2 x\,dx$ $\qquad$ **(2)** $\int \frac{1}{\tan x \sin x}\,dx$

Question 2: **(9+8+8 =25 Marks)**

(a)Use finite approximation to estimate the area under the graph of the function $f(x) = x^3$ between $x = 0$ and $x = 1$ using an upper sum with four rectangles of equal width.

(b) Suppose that $\sum_{k=1}^{10} a_k = 5$ and $\sum_{k=1}^{10} b_k = 10$ find $\sum_{k=1}^{10} (2a_k + 3b_k + 4)$

(c)Evaluate the following integral : (1) $\int_0^{\frac{\pi}{4}} \tan^3 x \sec^2 x\,dx$

Question 3: **(8+8+9= 25 Marks)**

(a) Find the definition of definite integral to evaluate the following integral. $\int_0^1 (2x+1)\,dx$

(b) Find an upper bound and lower bound of the following integral. $\int_{-2}^{-1} (x^2 - 4x)\,dx$

(c) Find the number C that satisfies the mean value theorem $\int_0^3 (x^2 - 2x + 1)\,dx$

Question 4: **(8+8+9=25 Marks)**

(a) Find the derivative of the following function $y = \int_{\sec x}^{2} (\sqrt{t^2 - 1}\,dt$

(b) Find the area of the region in closed by the following curves $y = x^2$ *and* $y = -x^2 + 4x$

(c) Find the volume of the solid generated by revolving the region bounded by $y = x^3$ $x = 2$ *and* $y = 0$ **about** *the* x **-axis**

End of Questions

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Best of luck