COMSATS Institute of Information Technology Lahore

Final Examination

Course Title:	Calculus andAnalyticGeometry			Course Code:	MTH104	Credit Hours:	3(3,
Course Instructor/s:	Dr.Mohsan Hassan, Dr. Aqeel, Dr. Shumaila, Dr. Tahir, Ms. Shazia			Program Name:	BSE/BCS/BCE/BEE		
Semester:	1st	Batch:	Section:	C	Date:	11-01-2018	
Time Allowed:	3Hours			Maximum Marks:		100	
Student's Name:				Reg. No.			

Important Instructions / Guidelines:

- Attempt all questions.
- Do all parts of a question in a sequence.
- Do not write anything on question paper except your name and registration number
- Calculator sharing is not allowed.

Question 1: Solve the inequality and express the solution in term of interval (10)

$|2x-7|>3$ $(-\infty,2)\cup(5,+\infty)$

Question 2: For what value of a (10)

$$f(x)=\begin{cases} a^2x-2a, & x\geq 2 \\ 12 & x<2 \end{cases}$$ $a=3,-2$ continuous.

is continuous at $x=2$.

Question 3: Find an equation for the tangent and normal lines to the parabola $y=x^2$ at the point $P(1,1)$. (10)

Question 4: Use implicit differentiation to find $\frac{d^2y}{dx^2}$ if $5y^2+\sin(xy)=x^2$. (10)

Question 5: Evaluate the following integrals (10)

(a) $\int \frac{1}{x^3}\sqrt{\frac{x^3-1}{x^3}}\,dx$

(b) $\int x^3\cos(x)\,dx$ $x^3\sin x + 3x^2\cos x - 6x\sin x - 6\cos x$

Question 6: (a) Find dy/dx by chain rule if $y=f(u)$ and $u=g(x)$ are given as (10)

$y=-\sec u,\ u=x^2+7x$ $-2x\sec u\tan u - 7\sec u\tan u$

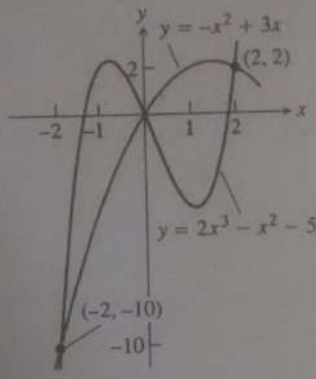
(b) Write the function in form $y=f(u)$ and $u=g(x)$. Then find dy/dx by chain rule if $4u^3\left(\frac{1}{u}x+1+\frac{1}{u^2}\right)$

Printed by abdfarooq at Jan 9, 2018 1:09:50 PM from CYBER NODE X BLOCK

$$\int_0^2 (-2x^3 + 8x)$$

$$y = \left(\frac{x^3}{8} + x - \frac{1}{x}\right)^4$$

Question 7: Find the area between curves as shown in Fig.

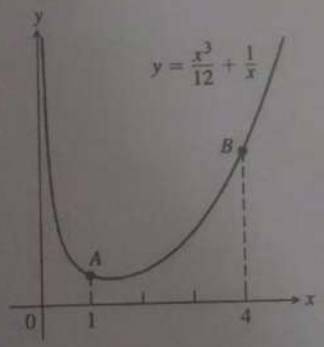


a = 0
b = 2

(0 - 2)

⇒ 8 sq. units

Question 8: Find the arc length of the graph of $f(x) = \frac{x^3}{12} + \frac{1}{x}$, $1 \le x \le 4$.



$$\int \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$$

$$\frac{x^4 - 4}{4x^2}$$

$$\frac{(x^2-2)(x^2+2)}{(2x)^2}$$

Question 9: Does the sequence whose nth term is $a_n = \sqrt[n]{n^2}$ converge ? If so, find $\lim_{n\to\infty}(a_n)$. = 0

Question 10: Investigate the convergence of the following series

(a) $\sum_{n=1}^{\infty} \frac{(2n)!}{n!\,n!}$ by ratio test,

4 > 1 divergent

2(n+1) = 2n+2

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{1+n}\right)^n$ by root test.

= 1 no conclusion.

sec x tan n

Best of Luck

Printed by shahzaraa at Jan 9, 2018 1:09:50 PM from CPrint Node 8 Block