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Ministry of Higher Education & Scientific Research
Muthanna University
College of Science
Department of mathematic and computer applications

Subject: foundations of mathematic I
Stage: 1st
Date: / /2017
Time :3hours

((Final exam for the first semester))
2017 -2018

21. 01. 2018

45

Remark\\ Twelve marks for every question and six marks for every branch

Q1\A\ let $A=\{-1,0,1\}$ and $P(x)=X^3\geq 1$ is an open statement over A. Find T_p ?
B\ Prove that a is an odd number iff $a+1$ is an even number .

Q2\ A\ Give an example with it is solution for the following case:
$P(A\cup B)\not\subset P(A)\cup P(B)$
B\ Let $\{A_i\}_{i\in I}$ is an indexed family of sets then $(\bigcap_{i\in I} A_i)^c=\bigcup_{i\in I} A_i^c$

Q3\A\ Let $R=\{(x,y)\in R\times R/x-y=1\}$ and $S=\{(x,y)\in R\times R/2x+y=2\}$. Find $R\cap S, R\cup S$ $R-S$?
B\ Let $\Re$ be a set of real numbers and let $R=\{(x,y)\in \Re\times\Re/x<y\}$.Does R be a strict order relation over $\Re$?

Q4\A\ Let R,S and T are relations over A then :
If $R\subseteq S$ then $T\circ R\subseteq T\circ S$
B\ Let Z be a set of integer numbers and let $R=\{(x,y)\in Z\times Z/x-y$ *accept division on* $3\}$
Does R be a partially ordered relation over Z ?

Q5\ A\ Let R is a relation over R then R be a symmetric relation iff $R=R^{-1}$
B\ Let R is an equivalence relation over A and let $a,b\in A$ if $b\in[a]$ then $[a]=[b]$.

Best luck

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Subject: Topic in gener
17. 01. 2018 athematics
Stage: First
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Date: / /2018

((Assessment of the final exam for the first semester))
Academic year 2017-2018

45

Q1\\ Use Cramer's rule to solve following system of linear equations

$az+y+z=4$

$x+y+z=a$

$x-y+az=2$

**********(10 Marks)

Q2\\Use mathematical induction to prove that

$$1^3+2^3+3^3+\ldots+n^3=n^2(n+1)^2/4$$

**********(10 Marks)

Q3\\ Use Gauss – Jordan method find inverse of

$$A=\begin{pmatrix}-1 & -3 & 1\\ 3 & 6 & 0\\ 1 & 0 & 1\end{pmatrix}.$$

**********(10 Marks)

Q4\\ Find the value of γ that make the following matrix non-singular

$$A=\begin{pmatrix}3 & -5 & 2\\ \gamma & 2 & 3\\ -1 & 4 & 1\end{pmatrix}.$$

**********(10 Marks)

Q5\\ Use operations of row to make the following matrix an upper matrix

$$B=\begin{pmatrix}-2 & -1 & 1\\ 5 & -7 & 6\\ 9 & 3 & 2\end{pmatrix}.$$

**********(10 Marks)

Q6\\ Find $A.(B-2C)+O$ where

$$A=\begin{pmatrix}1 & 2 & -1\\ -2 & 3 & 5\\ -1 & 7 & 3\end{pmatrix},\quad B=\begin{pmatrix}2 & 5 & 6\\ -2 & -5 & -6\\ 6 & 1 & 1\end{pmatrix},\quad C=\begin{pmatrix}-5 & -1 & -1\\ 3 & 0 & 1\\ 4 & 4 & 9\end{pmatrix}.$$

**********(10 Marks)

Best of luck

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Ministry of Higher Education & Scientific Research
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13 01. 2018

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Q1\\Find $\frac{dy}{dx}$ of each of the following(**choose 4 only**) (20 marks)

a- $y= x\tan^{-1}\frac{x}{a}-\frac{a}{2}\ln(x^2+a^2)+a^{x^2}$

b- $y= x^2\cosh^{-1}x^2-\sqrt{1-x^2}+4\log(3x^3+1)$

c- $y=(x^2+3)^{x^2}+x^3e^{\sin^3 x}+\ln(\sin^{-1}x^3)$

d- $\tan y^3=x^2e^{x^2+1}+\cosh(\sec(lnx))$

e- $x^4+x^2y^2+y^4=10$

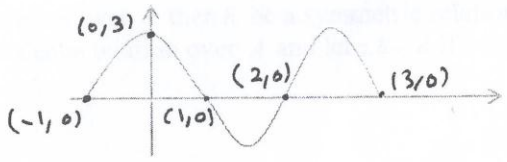
Q2\\ (12 marks)

i- let $f(x)=\begin{cases}3x^2-1 & x<0\\ ax+b & 0\le x\le 1\\ \sqrt{x+8} & x>1\end{cases}$

a-Determine values of **a** and ***b*** that make the given function continuous .
b-Sketch the graph of ***f(x)*** .

ii- Write the equation of tangents to curve $x^2+y^2+4x-2y-3=0$ at the points of its intersection with ***y-axis.***

Q3\\ i-The graph of the function y=f(x) is given. sketch the graph of **f(x-2),f(x)+3,f(-x)**and **2-f(1-x) .**



(7.5 marks)

ii-find $\frac{d^2y}{dx^2}$ from the equations: $x=t^2, y=t+t^3$. (4.5 marks)

Q4\\i- calculate each of the following limits:

$\lim_{x\to\infty}\frac{2x+3}{\sqrt{x^2-2x-3}}$, $\lim_{x\to 0}(sinx)^{\tan x}$, $\lim_{x\to 0}\frac{e^{2x}}{\ln(1+2x)}$ (6marks)

ii-Show that $cosh^{-1}x=\ln[x+\sqrt{x^2-1}\ ]$ (5marks)

iii-Let $y=\cos^{-1}x$ a- find D_f and R_f ,then sketch its. (5marks)

b-Show that $\sec^{-1}x=\cos^{-1}(\frac{1}{x})$.

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