269-97

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gust 14, 2004
e : 2 Hours

MATHEMATICS 204
FINAL EXAMINATION
Summer 2004

NAME ----------
ID# ----------

Circle your section number :

1 (10:00, Dr. Abu-Khuzam)
2 (11:15, Dr. Abu-Khuzam)
3 (8:45 , Dr. Lyzzaik)

PROBLEM GRADE

PART I

1 ------- / 4

2 ------- / 8

3 ------- / 7

4. ------- / 8

5 ------- / 13

PART II

6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
c	c	c	c	c	c	c	c	c	c	c	c	c	c	c
d	d	d	d	d	d	d	d	d	d	d	d	d	d	d
e	e	e	e	e	e	e	e	e	e	e	e	e	e	e

6-20 ------- / 60

TOTAL ------- /100

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PART I. Answer each of the following problems in the space provided for each problem (Problem 1 to Problem 5). (40 points)

1. One card is to be drawn at random from a deck of 52 cards. Find the probability of selecting an ace or a heart.

[4 points]

2. Let $f(x,y) = y^3 + x^2 - 3y + 6x + 10$. Determine the location and nature of all critical points.

[8 points]

critical points occure at

3. Let $f(x,y) = 5x^2 \ln y + x^4 y^3 + e^{xy}$

(a) Find f_x

[2 points]

(b) Find f_y

[2 points]

(c) Find f_{xy}

[3 points]

4. Sketch and find the area of the region bounded by the parabola $y = 4 - x^2$ and the line $y = 3x$.

[8 points]

5. Evaluate the following integrals.

(a) $\int 4x\, e^{x^2+7}\, dx$

[4 points]

(b) $\int \frac{4x}{x^2+1}\, dx$

[4 points]

5 (c) $\int 3x^2 (\ln x)\, dx$

[5 points]

PART II. Circle the correct answer for each problem of part II (Problem 6 to Problem 20) in the TABLE IN PAGE 1. [4 points for each correct answer, -1/2 point penalty for each wrong answer]. (60 points)

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

(a) $A^{-1} = A$
(b) $A^9 = A$
(c) $A^9 = O$ (zero matrix)
(d) A is not invertible
(e) none of the above

[4 points]

7. The number of ways in which 3 persons can be chosen from 10 persons so that one is a chairman, the second is a vice chairman and the third is a secretary is.

(a) ${}_{10}C_3$

(b) 10^3

(c) ${}_{10}P_3$

(d) 3^3

(e) none of the above

[4 points]

8. $\int_0^1 e^{\ln(x^2+4)}\,dx =$

(a) $17/3$

(b) $13/3$

(c) $7/3$

(d) $5/3$

(e) none of the above

[4 points]

9. $\int_0^1 x(x-1)^5\,dx =$

(a) $-1/21$

(b) $-1/84$

(c) $-1/42$

(d) $-1/11$

(e) none of the above

[4 points]

10. If

$$A=\begin{pmatrix}1 & 0 & 0\\ 1 & 1 & 0\\ 1 & 2 & 1\end{pmatrix}, \quad B=\begin{pmatrix}1\\ 2\\ 3\end{pmatrix}$$

Then $A^{-1}B =$

(a) $\begin{pmatrix}1\\ 1\\ 0\end{pmatrix}$ (b) $\begin{pmatrix}1\\ 1\\ 1\end{pmatrix}$ (c) $\begin{pmatrix}0\\ 1\\ 1\end{pmatrix}$ (d) $\begin{pmatrix}-2\\ 1\\ 3\end{pmatrix}$ (e) none of the above

[4 points]

11. A box contains 5 mathematics books and 4 history books. 3 books are to be selected at random from the box without replacement. What is the probability that the first book will be a mathematics book and the second and third are history books?

(a) 0.4961
(b) 0.2830
(c) 0.3570
(d) 0.1190

[4 points]

12. A fair coin is to be flipped four times. The probability that exactly 3 heads will occur is:

(a) 0.5
(b) 0.25
(c) 0.625
(d) 0.75
(e) none of the above

[4 points]

13. *Let* $f(x) = x^5 - 2x^4 + 3x^3 + x - 5$. Then $f'''(1)$ is equal to:

(a) 10
(b) 20
(c) 30
(d) 40
(e) none of the above

[4 points]

14. Let $f(x, y) = -2x^2 + xy + 2x + y^2 - 5y$. Then the point (1,2,-4) is:

(a) a relative minimum point
(b) a relative maximum point
(c) a saddle point
(d) none of the above

[4 points]

15. The estimated value of the definite integral $\int_2^6 (x^2 - 5)dx$ using the trapezoidal rule with n=4 (subdividing into 4 equal subintervals) is:

(a) 49
(b) 51
(c) 48
(d) 50

[4 points]

16. The marginal cost (in dollars) of producing a product is $MC = 8x + 800$, where x is the number of products produced. It is known that the total cost equals $60,000 when 40 units are produced (ie C(40)=60000). Then the total cost function is :

(a) $C(x) = 4x^2 + 800x$
(b) $C(x) = 4x^2 + 800x - 41{,}600$
(c) $C(x) = 4x^2 - 800x + 80{,}000$
(d) $C(x) = 4x^2 - 800x + 21{,}600$
(e) none of the above

[4 points]

17. Let $A=\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & -2 \\ -2 & 0 & 0 \end{pmatrix}$. Then the determinant of the matrix of cofactors A_c is equal to:

(a) 4
(b) −2
(c) 16
(d) 64
(e) none of the above

[4 points]

18. If $A=\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$ such that $|A|=3$, then $\begin{vmatrix} 3g & 3h & 3i \\ 3a+d & 3b+e & 3c+f \\ 5a & 5b & 5c \end{vmatrix}$ is equal to:

(a) 15
(b) -135
(c) -45
(d) 45
(e) none of the above

[4 points]

19. Given a random variable X which is normally distributed , with mean $\mu = 130$ and standard deviation $\sigma = 8$. The probability $P\ (128 < X < 142)$ is:

(a) 0.1824
(b) 0.5319
(c) 0.2854
(d) 0.3186
(e) 0.2195

[4 points]

20. Let $f(x) = \ln(x^2 + 2x + 1)$. Then $f'(0)$ is equal to:

(a) 1
(b) 2
(c) 0
(d) 10
(e) none of the above

[4 points]

Area Under the Standard Normal Curve

	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2523	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.49865	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990