Final Exam, Math 128 - Dec 18, 2006

Name:
ID:
Discussion Section:

This exam has 12 multiple choice questions, 3 points each.

Important:

- No graphing calculators!
- You are allowed a 3×5 note card and the normal table for the exam.
- Please be careful with your calculations—each problem is valuable.

1. Find the point where $f(x, y) = 2x^2 + y^3 - x - 12y + 7$ has a relative minimum.

   (a) $(\frac{1}{4}, -2)$

   (b) $(\frac{1}{4}, 2)$

   (c) 2 or -2

   (d) $\frac{1}{4}$

2. Let $f(x, y) = (x + y^2)^3$. Calculate $\frac{\partial^2 f}{\partial x \partial y}(1, 2)$.

   (a) 300

   (b) 0

   (c) 36

   (d) 120

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3. Find the volume of the solid of revolution generated by revolving about the x-axis the region under $y = 2x + 1$ from $x = 0$ to $x = 1$.

   (a) $\frac{13}{3}$

   (b) 2

   (c) $\frac{13\pi}{3}$

   (d) 2π

4. Solve the initial value problem $t^2y' + ty = 2$, $y(1) = 1$, $t > 0$.

   (a) $y = \frac{t}{2\ln t + 1}$

   (b) $y = 2\ln t + C$

   (c) $y = \frac{2\ln t + 1}{t}$

   (d) $y = 2\ln t + 1$

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5. Find

$$\int \frac{2-x}{\sqrt{2x^2-8x+1}}\,dx\,.$$

(a) $-\frac{1}{2}\sqrt{2x^2-8x+1}+C$

(b) $-\frac{2}{3}\left(2x^2-8x+1\right)^{\frac{-3}{2}}+C$

(c) $-\frac{1}{2}\ln(2x^2-8x+1)+C$

(d) $-\frac{3}{2}\frac{1}{\sqrt{2x^2-8x+1}}+C$

6. The angle of elevation from an observer to the top of a building is 29 degrees. If the observer is 100 meters from the base of the building, how high is the building (in meters)?

(a) 54.63

(b) 29

(c) $\frac{121}{2}$

(d) 11.73

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7. Approximate the positive solution of $e^x - 4 = x$. Let $x_0 = 2$ and find the third approximation (i.e., x_3) using the Newton - Raphson algorithm.

   (a) 1.78

   (b) 1.749

   (c) 1.21

   (d) 1.104

8. Find the rational number whose decimal expansion is 4.011011.....

   (a) $\frac{11}{999}$

   (b) $\frac{4011}{1000}$

   (c) $\frac{4016}{1001}$

   (d) $\frac{4007}{999}$

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9. Find

$$\int x^2 \sin x \, dx \, .$$

(a) $-x^2 \cos x + 2x \sin x + C$

(b) $(2 - x^2) \cos x + 2x \sin x + C$

(c) $\sin x - x \cos x + C$

(d) $-x^2 \cos x + C$

10. The number X of calls received by a telephone switchboard during a 1-minute interval is Poisson distributed with $\lambda = 5$. Determine the probability that three or more calls arrive during a particular minute.

(a) .87535

(b) .12465

(c) $\frac{1}{125}$

(d) .14062

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11. Find the expected value of the random variable whose probability density function is $f(x) = 12x(1-x)^2$, $0 \leq x \leq 1$.

    (a) $\frac{4}{5}$

    (b) $\frac{1}{2}$

    (c) $\frac{2}{5}$

    (d) 1

12. The men hired by a certain city police department must be at least 69 inches tall. Suppose that the heights of adult men in the city are normally distributed with $\mu = 70$ inches and $\sigma = 2$ inches. What percentage of the men are tall enough to be eligible for recruitment by the police department?

    (a) 80.85%

    (b) 70.88%

    (c) 79.12%

    (d) 69.15%

Appendix E
Areas under the Standard Normal Curve

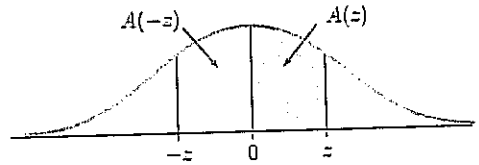

TABLE E.1 Areas under the Standard Normal Curve

z	.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	.0754
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	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2996	.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	.3820
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	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998