Time: 2 hours   Math 204   24/01/07

Final Exam

Fall Semester 06/07

Instructor: Mrs. Muna Jurdak

Section 9:   Thurs 3:30 p.m.   Section 10: Tues. 2:00 p.m.

Section 11: Tues. 12:30 p.m.   Section 12: Tues. 11:00 a.m.

Instructions:

1. Write your name and ID number clearly where indicated.

2. Circle your section number above, according to the time of the problem solving session in which you are enrolled.

3. **Solve the problems on this, the white question sheet**. Use the colored sheets for scratch work only. You may use the back of a white sheet to complete the solution of a problem.

4. Write your name on the colored scratch sheet also.

5. **Show your work** in all the problems.

6. If you fail to write your name, ID number, or to circle your section number, **you will lose grades.**

Problem	Grade	Problem	Grade
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	
Final Exam Grade		/100	

(8%) 1. Find the coordinates of all critical points of the following function and determine the nature of each point.

$f(x,y) = x^3 - y^2 - 3x + 4y - 5$

(7%) 2. Find the 4 second-order partial derivatives for the function

$F(x,y) = \dfrac{5x}{y^3}$

(8%) 3.Given the integral $\int_{1}^{3}\sqrt{x^2+1}\,dx$.

(a)Approximate the above integral using the Rectangle Rule, with the number of subintervals n = 4.

(b) Approximate the above integral using Simpson's Rule, also with n = 4.

(12%) 4. Evaluate each integral:

(a) $\int_{0}^{1} x^4(x^5-1)^7\,dx$

(b) $\int\left(\frac{1}{x^4}\right)e^{\left(1/x^3\right)}\,dx$

(c) $\int \dfrac{dx}{\sqrt{x}\left(\sqrt{x}+3\right)}$

(d) $\int \dfrac{x}{\sqrt{2x-1}}dx$

(6%) 5. Find g(x), if $g''(x) = 12x^2 + e^x$, $g'(0) = 2$, and $g(0) = 5$.

(8%) 6. The solution to a system of equations having the matrix form
AX = B can be found by the matrix multiplication $X = \begin{pmatrix} 6 & -7 \\ -2 & 3 \end{pmatrix}\begin{pmatrix} 15 \\ 11 \end{pmatrix}$. What
was the original system of equations? (Write the answer as a system of 2
equations with 2 unknowns.) Show your work.

(13%) 7. A fair die is rolled 3 times. Let X be the number of 6's obtained.
   (a) Construct the probability distribution of X.

   (b) Find the probability that no more than two 6's are obtained.

   (c) Find the mean and standard deviation of the probability distribution of the variable X.

(7%) 8. Given the function $z = f(x,y) = 25x^2 y - 10xy + 200x - 500$.
   (a) Find $f(10,1)$.

   (b) Using a certain derivative, estimate the expected change in z, if y increases by 1 unit, and x remains constant.

   (c) Compare the expected change found in (b) with the actual change in z, if y increases by 1 unit.

(9%) 9. Referring to the following figure, set up the combinations of definite integrals that would compute each of the following areas:
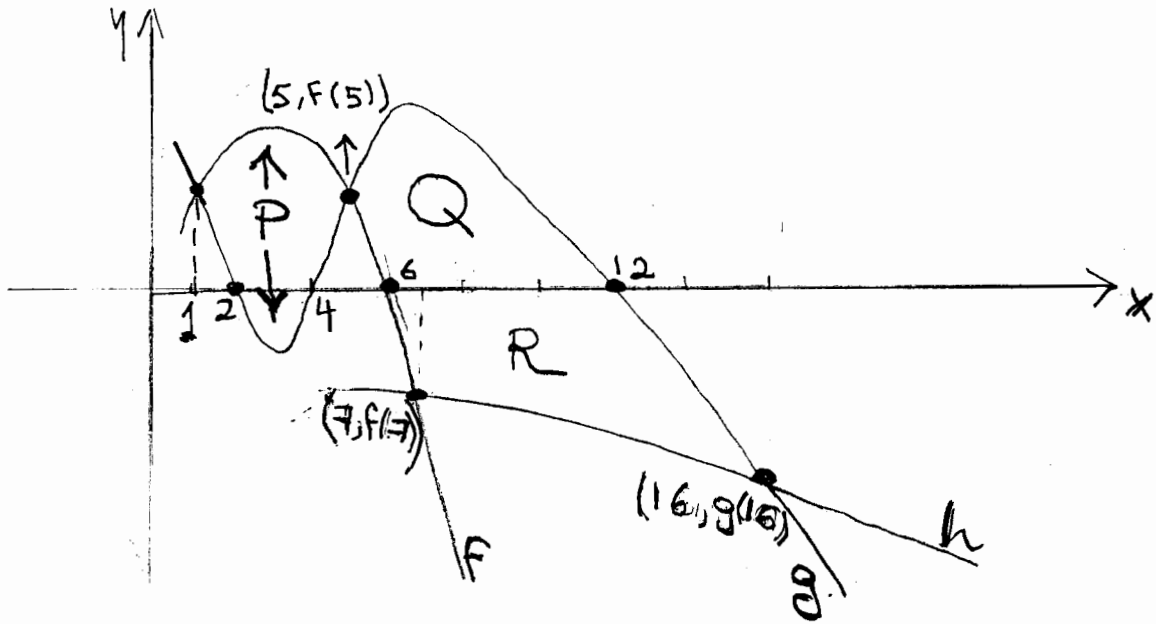
(a) Area of region P.

(b) Area of region Q.

(c) Area of region R.

(8%) 10. A box contains a set of 30 balls: 20 red, 5 blue and 5 green in color. Three balls are selected at random from the box, one at a time, consecutively. What is the probability that the three balls are of three different colors,

    (a) If the selection is done with replacement? Explain.

    (b) If the selection is done without replacement? Explain.

(6%) 11. Find the area of the region bounded below by the curve $y = x^2 - 4$, above by the line $y = 2 - x$, and to the left by the y-axis. Draw a sketch.

(8%) 12. The scores on a test are normally distributed, with a mean of 100 and a standard deviation of 15. If a personnel manager of a company, wishes to select from the top 20% of the applicants who take the test, find the cutoff score (lowest score that would be considered for selection).

TABLE 14.26 | **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	.2823	.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

Figure 14.9

Area = 0.3413 Area = 0.3413