Suffolk County Community College

Michael J. Grant Campus

Department of Mathematics

Friday, May 12, 2017

MAT 142
Calculus with Analytic Geometry II

Final Exam

Instructor:

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Please print the requested information in the spaces provided:

Student:

Name:	
Student Id:	
Email:	*include to receive the final grade via email* ONLY *if you are not getting email updates already*

- *Notes and books are permitted on this exam.*
- *Graphing calculators, computers, cell phones and any communication-capable devices are prohibited. Their mere presence in the open (even without use) is a sufficient reason for an immediate dismissal from this exam with a failing grade.*
- *You will not receive full credit if there is no work shown, even if you have the right answer. Use back pages if necessary. Please don't attach additional pieces of paper: if you run out of space, please ask for another blank final.*

Problem 1. Compute the integral

$$\int e^{\sqrt{x}} \ \mathtt{d}x.$$

Space for your solution:

Problem 2. Compute the integral

$$\int x \ \cos(6x^2 - 1) \ \mathtt{d}x.$$

Space for your solution:

Problem 3. Compute the integral

$$\int \frac{x^3 - 8x^2 + 21x - 19}{x^2 - 6x + 9} \; \mathtt{d}x.$$

Space for your solution:

Problem 4. Consider the function $f(t) = \ln(t)$.

(1). Which point (or points) x from the domain of the function f would be a good choice for the center of the Taylor polynomial for f and why?

Space for your solution:

(2). Taking as $f(t) = \ln(t)$ and x being your choice in part (1), fill the table

i	$\left(\frac{\mathrm{d}}{\mathrm{d}t}\right)^i f(t)$	$\left(\frac{\mathrm{d}}{\mathrm{d}t}\right)^i \Big\vert_{t=x} f(t)$
0		
1		
2		
3		
4		
5		
6		

Try to write your result in the form that would make it easy to see the general pattern for the i-th term of the Taylor polynomial.

Space for your solution:

(3). Compute the Taylor polynomial of degree 6 for the function f at one of the points you found in part (1). Be as explicit in your answer as you can. The explicit result is more important than a general pattern. In particular, don't use the $\sum$ notation for the sum.

Space for your solution:

(4). Compute the Taylor polynomial of degree n for the function f at one of the points you found in part (1). General pattern of the answer is more important here than being explicit. Use the $\sum$ notation for the sum.

Space for your solution:

(5). Compute the error term for the Taylor polynomial of degree n for the function f at one of the points you found in part (1).

Space for your solution:

(6). Find

- an estimate $E(n)$ of the error from part (5),
- conditions on the size of Δx that guarantee that

$$\lim_{n \to +\infty} E(n) = 0$$

Make sure that your conditions cover the case needed for part (7).

Space for your solution:

(7). Using your estimate of the error term from part (6), compute $\ln(1.2)$ with guaranteed accuracy of at least 0.01.

Space for your solution: