MATH 1242 – CALCULUS II   Fall 2019

COMMON FINAL EXAMINATION

UNC CHARLOTTE
Department of Mathematics and Statistics

Last Name: _____   First Name:_____
(Please PRINT)   (Please PRINT)

Student ID #:_____   Instructor: _____ Section:_____

This exam is divided into three parts. **NO calculators may be used on part I or during the first hour of the exam.** You may start working on parts II and III of the exam within the first hour, but you cannot use your calculator during this time. You may use your calculator ONLY after your exam proctor has announced that calculators are allowed on Parts II and III. (Texas Instruments 83 or 84 or equivalent models of other brands are allowed. TI Inspire, TI 89 or equivalent calculators are NOT allowed on this exam.)

PART I
- Part I consists of 15 multiple choice problems. These problems must be answered without the use of a calculator.
- You must use a pencil with soft black lead (#2 or HB) to indicate your answers on the Opscan sheet.
- For each question, choose the response which best fits the question.
- If you wish to change an answer, make sure that you completely erase your old answer and any extraneous marks.
- There is no penalty for guessing.
- If you mark more than one answer to a question, that question will be marked as incorrect.
- You may perform your calculations on the test itself or on scratch paper, but do not make any stray marks on the Opscan sheets.
- Make sure that your name appears on the Opscan sheet and that you fill in the circles corresponding to your name in the format Last, First.
- At the end of the exam you must hand in all test material including the test booklets, Opscan sheet and scratch paper.

Part I (MULTIPLE CHOICE, NO CALCULATORS).

1. Consider the graph of the function f on $[0,1]$:
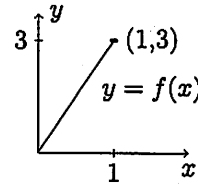
$\int_0^1 f(x)\,dx = ?$

(a) 3

(b) $\frac{3}{2}$

(c) 0

(d) 2

(e) 1

2. $\int_{-1}^{2} 4x^3\,dx = ?$

(a) 15

(b) 16

(c) 36

(d) 40

(e) 20

3. $\int \cos(1+2x)\,dx = ?$

(a) $2\sin(1+2x) + C$

(b) $\sin(1+2x) + C$

(c) $\cos(1+2x) + C$

(d) $\frac{1}{2}\cos(1+2x) + C$

(e) $\frac{1}{2}\sin(1+2x) + C$

4. $\int_0^1 x(x^2+1)^3 \, dx = ?$

(a) 8

(b) $\frac{15}{16}$

(c) $\frac{15}{4}$

(d) 1

(e) $\frac{15}{8}$

5. $\int_a^b x^2 e^{x^3} \, dx = ?$

(a) $e^{b^3} - e^{a^3}$

(b) $\frac{2}{3}(e^{b^3} - e^{a^3})$

(c) $\frac{1}{3}(e^{b^3} - e^{a^3})$

(d) $\frac{1}{3}(b^3 - a^3)(e^{b^3} - e^{a^3})$

(e) 0

6. $\int x e^{-x} \, dx = ?$

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

(b) $-\frac{1}{2}x^2 e^{-x} + C$

(c) $x e^{-x} + C$

(d) $-e^{-x} - x e^{-x} + C$

(e) $e^{-x} + x e^{-x} + C$

7. If $f(x) = \int_1^{x^3} \sin(t^2)\, dt$, then $f'(x) = ?$

(a) $3x^2 \sin(2x)$

(b) $3x^2 \sin(x^2)$

(c) $3x^2 \sin(x^6)$

(d) $x^3 \sin(x^6)$

(e) $3x^2 \cos(x^2)$

8. Find the area under the graph of $y = x^2$ (and above the x-axis) for $-1 \le x \le 1$.

(a) 1

(b) 2

(c) $\frac{2}{3}$

(d) $\frac{1}{3}$

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

9. The improper integral $\displaystyle\int_2^\infty \frac{dx}{\sqrt{x}}$

(a) diverges.

(b) converges to 1.

(c) converges to 2.

(d) converges to $\frac{1}{2}$.

(e) converges to 4.

10. Consider the following table of values for the function f:

x	0	0.25	0.5	0.75	1.0
$f(x)$	2	3	-1	4	6

Use the midpoint rule with 2 subintervals of equal width to approximate $\int_0^1 f(x)\, dx$.

(a) -1

(b) 7

(c) 14

(d) $\frac{7}{2}$

(e) $-\frac{1}{2}$

11. Which of the following is correct?

(a) $\int x^4 e^x\, dx = \frac{1}{5}x^5 e^x + C$

(b) $\int x^4 e^x\, dx = 4x^3 e^x + C$

(c) $\int x^4 e^x\, dx = x^4 e^x - \int 4x^3 e^x\, dx$

(d) $\int x^4 e^x\, dx = 4x^3 e^x - \int x^3 e^x\, dx$

(e) $\int x^4 e^x\, dx = \frac{1}{5}x^5 e^x - \int 4x^3 e^x\, dx$

12. The series $x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!} - \dfrac{x^7}{7!} + \cdots$

(a) diverges.

(b) converges to $\ln(x)$.

(c) converges to $\sin(x)$.

(d) converges to e^x.

(e) converges to $\cos(x)$.

13. The region in the first quadrant bounded by the graphs of $y = x^3$, $y = 0$, and $x = 1$ is rotated about the x-axis. The volume of the resulting solid is

(a) 1

(b) π

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

(d) $\frac{\pi}{7}$

(e) $\frac{\pi}{4}$

14. $\displaystyle\int \frac{x^3 + x + 2}{x^2 + 1}\, dx = ?$

(a) $x + 2\arctan(x) + C$

(b) $\frac{1}{2}x^2 + 2\arctan(x) + C$

(c) $\ln(x^2 + 1) + C$

(d) $\dfrac{\frac{1}{4}x^4 + \frac{1}{2}x^2 + 2x}{\frac{1}{3}x^3 + x} + C$

(e) $\ln\left(\dfrac{x^3 + x + 2}{x^2 + 1}\right) + C$

15. Find the interval of convergence for the power series $\displaystyle\sum_{n=0}^{\infty} n(x - 2)^n$.

(a) $[-1, 1]$

(b) $(-1, 1)$

(c) $[1, 3]$

(d) $(1, 3)$

(e) $\left(-\frac{1}{3}, \frac{1}{3}\right)$