MA 16200
EXAM 2 Green
March 7, 2019

NAME ____________________ YOUR TA'S NAME ____________________

STUDENT ID # ____________________ RECITATION TIME ____________________

Write the following in the TEST/QUIZ NUMBER boxes: **00** (and blacken in the appropriate digits below the boxes)

You must use a #2 pencil on the mark–sense sheet (answer sheet).On the mark–sense sheet, fill in your TA's name and the COURSE number. Fill in your NAME and STUDENT IDENTIFICATION NUMBER and blacken in the appropriate spaces. Fill in your four-digit SECTION NUMBER. If you do not know your section number, ask your TA. Sign the mark–sense sheet.

There are **12** questions, each worth 8 points (you will automatically earn 4 points for taking the exam). Blacken in your choice of the correct answer in the spaces provided for questions 1–12. Do all your work in this exam booklet. Use the back of the test pages for scrap paper. Turn in both the mark–sense sheet and the exam booklet when you are finished.

If you finish the exam before 8:50, you may leave the room after turning in the scantron sheet and the exam booklet. You may not leave the room before 8:20. If you don't finish before 8:50, you MUST REMAIN SEATED until your TA comes and collects your scantron sheet and your exam booklet.

EXAM POLICIES

1. Students may not open the exam until instructed to do so.
2. Students must obey the orders and requests by all proctors, TAs, and lecturers.
3. No student may leave in the first 20 min or in the last 10 min of the exam.
4. Books, notes, calculators, or any electronic devices are not allowed on the exam, and they should not even be in sight in the exam room. Students may not look at anybody else's test, and may not communicate with anybody else except, if they have a question, with their TA or lecturer.
5. After time is called, the students have to put down all writing instruments and remain in their seats, while the TAs will collect the scantrons and the exams.
6. Any violation of these rules and any act of academic dishonesty may result in severe penalties. Additionally, all violators will be reported to the Office of the Dean of Students.

I have read and understand the exam rules stated above:

STUDENT NAME: ____________________

STUDENT SIGNATURE: ____________________

1. $\displaystyle\int \frac{x+13}{x^2+5x-6}\,dx \;=$

A. $\ln\left|\dfrac{x-1}{(x+6)^2}\right| + C$

B. $\ln\left|\dfrac{x+3}{x+2}\right| + C$

C. $\ln\left|\dfrac{2(x-1)}{x+6}\right| + C$

D. $\ln\left|\dfrac{(x-1)^2}{x+6}\right| + C$

E. $\ln\left|\dfrac{x+2}{x+3}\right| + C$

2. $\displaystyle\int \frac{2x^3+5x^2+8x+4}{(x^2+2x+2)^2}\,dx \;=$

A. $\displaystyle\int \frac{2x+2}{x^2+2x+2}\,dx + \int \frac{2x+1}{(x^2+2x+2)^2}\,dx$

B. $\displaystyle\int \frac{2x+1}{x^2+2x+2}\,dx + \int \frac{2x+2}{(x^2+2x+2)^2}\,dx$

C. $\displaystyle\int \frac{2x}{x^2+2x+2}\,dx + \int \frac{2x+1}{(x^2+2x+2)^2}\,dx$

D. $\displaystyle\int \frac{2x}{x^2+2x+2}\,dx + \int \frac{2x+2}{(x^2+2x+2)^2}\,dx$

E. $\displaystyle\int \frac{2x+1}{x^2+2x+2}\,dx + \int \frac{2x}{(x^2+2x+2)^2}\,dx$

3. The curve $y = \sin x, \quad 0 \le x \le \dfrac{\pi}{2}$, is rotated around the x-axis to generate a surface S. Which of the following formulas represents the surface area of S?

A. $\displaystyle\int_0^{\frac{\pi}{2}} 2\pi \sin x \sqrt{1+\cos^2 x}\, dx$

B. $\displaystyle\int_0^{1} 2\pi y \sqrt{1+(\cos^{-1} y)^2}\, dy$

C. $\displaystyle\int_0^{1} 2\pi \sin^{-1} y \sqrt{1+\frac{1}{1-y^2}}\, dy$

D. $\displaystyle\int_0^{\frac{\pi}{2}} 2\pi x \sqrt{1+\cos^2 x}\, dx$

E. $\displaystyle\int_0^{\frac{\pi}{2}} 2\pi \sin x \sqrt{1+\frac{1}{1-x^2}}\, dx$

4. $\displaystyle\int_0^{2\sqrt{2}} \frac{x^2\, dx}{\sqrt{16-x^2}} =$

A. 2π

B. $2\pi - 2$

C. $2\pi + 2$

D. $2\pi - 4$

E. $2\pi + 4$

5. $\displaystyle\int_{\frac{1}{12}}^{\frac{1}{4}} \frac{12\ dt}{\sqrt{t}+4t\sqrt{t}} \ =$

A. 6π

B. 4π

C. π

D. 3π

E. 2π

6. Find the length of the curve given by

$$x^{2/3}+y^{2/3}=1$$

for $0 \le x \le 1$ and $0 \le y \le 1$.

A. $\dfrac{4}{3}$

B. $\dfrac{8}{5}$

C. $\dfrac{13}{9}$

D. $\dfrac{3}{2}$

E. $\dfrac{5}{3}$

7. Which expression represents the y-coordinate of the centroid of the region of the plane bounded by $y = x^2$ and $x = y^2$?

A. $\dfrac{\int_0^1 (x - x^{3/2})\, dx}{\int_0^1 (\sqrt{x} - x^2)\, dx}$

B. $\dfrac{\int_0^1 (x - x^{3/2})\, dx}{2\int_0^1 (\sqrt{x} - x^2)\, dx}$

C. $\dfrac{\int_0^1 (x^3 - x^{3/2})\, dx}{\int_0^1 (\sqrt{x} - x^2)\, dx}$

D. $\dfrac{\int_0^1 (x^{3/2} - x^3)\, dx}{2\int_0^1 (\sqrt{x} - x^2)\, dx}$

E. $\dfrac{\int_0^1 (x - x^4)\, dx}{2\int_0^1 (\sqrt{x} - x^2)\, dx}$

8. $\displaystyle\int_0^1 \frac{1}{\sqrt{x}}\, dx$

A. 1

B. $\frac{2}{3}$

C. 2

D. $\frac{1}{2}$

E. Divergent

9. Which statement is true for the following sequence?

$$a_n = \sqrt{n+1} - \sqrt{n}$$

where $n = 1, 2, \ldots$

A. The sequence is divergent and decreasing.

B. The sequence is divergent and not monotonic.

C. The sequence is convergent and not monotonic.

D. The sequence is divergent and increasing.

E. The sequence is convergent and decreasing.

10. $\dfrac{1}{e} + \dfrac{1}{e^2} + \dfrac{1}{e^3} + \dfrac{1}{e^4} + \ldots$

A. converges to $\dfrac{e}{1-e}$

B. converges to $\dfrac{1}{1-e}$

C. diverges

D. converges to $\dfrac{e}{e-1}$

E. converges to $\dfrac{1}{e-1}$

11. Only one of these series converges. Which one?

A. $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$

B. $\displaystyle\sum_{n=2}^{\infty} \frac{e^n}{\ln n}$

C. $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{n+3^n}$

D. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

E. $\displaystyle\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$

12. Assume each a_n is positive. Which one of the following conditions guarantees that the series $\displaystyle\sum_{n=1}^{\infty} a_n$ diverges?

A. $\displaystyle\lim_{n\to\infty} \frac{a_n}{1/2^n} = 1$

B. $a_n > \dfrac{1}{n^2}$ for all n

C. $a_n < \dfrac{1}{n}$ for all n

D. $\displaystyle\lim_{n\to\infty} \frac{a_n}{\sqrt{2^n}} = 1$

E. $\displaystyle\lim_{n\to\infty} \frac{a_n}{1/n^2} = \infty$