MA 16200
EXAM 2
10/21/2021
TEST/QUIZ NUMBER: **1010**

NAME _____ YOUR TA'S NAME _____

STUDENT ID # _____ RECITATION TIME _____

You must use a #2 pencil on the scantron sheet. Write **1010** in the TEST/QUIZ NUMBER boxes and blacken in the appropriate digits below the boxes. On the scantron sheet, fill in your **TA**'s name for the INSTRUCTOR and **MA 162** for the COURSE number. Fill in whatever fits for your first and last NAME. The STUDENT IDENTIFICATION NUMBER has ten boxes, so use **00** in the first two boxes and your PUID in the remaining eight boxes. Fill in your three-digit SECTION NUMBER. If you do not know your section number, ask your TA. Complete the signature line.
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 and indicate your answers in the booklet in case the scantron is lost. Use the back of the test pages for scrap paper. Turn in both the scantron sheet and the exam booklet when you are finished.
If you finish the exam before 7:20, you may leave the room after turning in the scantron sheet and the exam booklet. You may not leave the room before 6:50. If you don't finish before 7:20, 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. $\displaystyle\int_0^{1/2} \left(\frac{1}{\sqrt{1-x^2}}\right)^3 dx$

A. $\pi/6$

B. $\pi/3$

C. $\sqrt{3} + \frac{1}{2}\ln\left(2+\sqrt{3}\right)$

D. $1/\sqrt{3}$

E. $\sqrt{3}$

F. $\frac{1}{\sqrt{3}} + \frac{1}{2}\ln\left(2+\frac{1}{\sqrt{3}}\right)$

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

A. $x + \ln|x| + \ln(x^2+1) + 2\tan^{-1} x + C$

B. $x + \ln|x| + \ln(x^2+1) + \tan^{-1} x + C$

C. $\ln|x| + \ln(x^2+1) + 2\tan^{-1} x + C$

D. $\ln|x| + \ln(x^2+1) + \tan^{-1} x + C$

E. $\ln|x| + 2\ln(x^2+1) + 2\tan^{-1} x + C$

F. $x + \ln|x| + 2\ln(x^2+1) + 2\tan^{-1} x + C$

3. $\displaystyle\int_0^{\pi/3} \tan^3 x \, dx$

A. $\dfrac{2}{\sqrt{3}}$

B. $\dfrac{3}{2} - \ln 2$

C. $\dfrac{9}{16}$

D. $(\ln 2)^3$

E. 9

F. $2 + \ln \dfrac{1}{2}$

4. Find the correct form of the partial fraction decomposition of the following function:

$$\frac{x^6 + x^3 - x^2 + 1}{(x^5 + x^3)(x-1)^2}$$

A. $\dfrac{Ax+B}{x^5+x^3} + \dfrac{C}{x-1} + \dfrac{D}{(x-1)^2}$

B. $\dfrac{A}{x^2+1} + \dfrac{B}{x^3} + \dfrac{C}{(x-1)^2}$

C. $\dfrac{A}{x} + \dfrac{B}{x^2} + \dfrac{C}{x^3} + \dfrac{D}{x^2+1} + \dfrac{E}{x-1} + \dfrac{F}{x+1}$

D. $\dfrac{Ax+B}{x^5+x^3} + \dfrac{C}{x+1} + \dfrac{D}{x-1}$

E. $\dfrac{Ax+B}{(x-1)^2} + \dfrac{Cx+D}{x^2+1} + \dfrac{E}{x^3}$

F. $\dfrac{Ax+B}{x^2+1} + \dfrac{C}{x} + \dfrac{D}{x^2} + \dfrac{E}{x^3} + \dfrac{F}{x-1} + \dfrac{G}{(x-1)^2}$

5. $\displaystyle\int_0^1 x^2 e^{x^3}\, dx$

A. $\dfrac{e+2}{3}$

B. $\dfrac{e-1}{3}$

C. $e-2$

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

E. $e+2$

F. $e-1$

6. $\displaystyle\int \frac{dx}{\sqrt{x^2-6x+10}}$

A. $\dfrac{\sqrt{x^2-6x+10}}{x-3}+C$

B. $\tan^{-1}(x-3)+C$

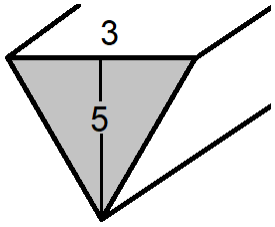
C. $\dfrac{\ln\left|\sqrt{x^2-6x+10}\right|}{2x-6}+C$

D. $\ln\left|x-3+\sqrt{x^2-6x+10}\right|+C$

E. $\dfrac{3-x}{\sqrt{x^2-6x+10}}+C$

F. $\tan^{-1}(x-3)+\ln\left|\sqrt{x^2-6x+10}\right|+C$

7. A trough filled with liquid has an isosceles triangle of width 3m and height 5m as one of its ends. Find the force due to pressure on this part of the trough. Use ρ for the liquid density (kg/m^3) and g for the gravitation constant (N/kg).



A. $\frac{25}{2}\rho g$ N

B. $\frac{81}{10}\rho g$ N

C. $15\rho g$ N

D. $\frac{125}{18}\rho g$ N

E. $\frac{15}{2}\rho g$ N

F. $25\rho g$ N

8. $\int \cos^5 x \sin^2 x \, dx$

A. $\frac{2}{5}\cos^5 x - \frac{1}{3}\cos^3 x - \frac{1}{7}\cos^7 x + C$

B. $\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 x + C$

C. $\frac{1}{7}\sin^7 x - \frac{2}{5}\sin^5 x + \frac{1}{3}\sin^3 x + C$

D. $\frac{1}{7}\sin^7 x + C$

E. $\frac{1}{5}\cos^5 x - \frac{1}{3}\cos^3 x + C$

F. $\frac{1}{6}\cos^6 x + C$

9. $\displaystyle\int_0^{\pi/4} x \sin x \cos x \, dx$

A. $\dfrac{\pi+1}{8}$

B. $\dfrac{\pi}{4}$

C. $\dfrac{1}{4}$

D. $\dfrac{\pi+1}{4}$

E. $\dfrac{\pi}{8}$

F. $\dfrac{1}{8}$

10. $\displaystyle\int_2^{\infty} \frac{dx}{x}$

A. This improper integral converges to $\ln \frac{1}{4}$

B. This improper integral converges to $\frac{1}{4}$

C. This improper integral converges to $\ln \frac{1}{2}$

D. This improper integral converges to $\ln 2$

E. This improper integral diverges

F. This improper integral converges to $\frac{1}{2}$

11. Find the first four terms of the **sequence of partial sums** associated with the series

$$\sum_{k=1}^{\infty}(-1)^k$$

Hint: $\{S_n\}$, the sequence of partial sums of the series $\sum_{k=1}^{\infty} a_k$, is given by $S_n = \sum_{k=1}^{n} a_k$

A. $-1, 0, -1, 0$

B. $-1, 1, -1, 1$

C. $1, -1, 1, -1$

D. $0, -1, 0, -1$

E. $1, 0, 1, 0$

F. $0, 1, 0, 1$

12. Which of the following recurrence relations will generate a sequence with $a_3 = -3$?

A. $a_{n+1} = 1 - 2a_n;\ \ a_1 = 1$

B. $a_{n+1} = -a_n;\ \ a_1 = 1$

C. $a_{n+1} = a_n + 1;\ \ a_1 = -5$

D. $a_{n+1} = 3a_n;\ \ a_1 = -1$

E. $a_{n+1} = a_n - 3;\ \ a_1 = 0$

F. $a_{n+1} = -9/a_n;\ \ a_1 = 3$