MA 16600
EXAM 2 INSTRUCTIONS
Version 11
March 9, 2022

Your Name __________________________ Your TA’s Name __________________________

PUID # __________________________ Recitation # __________________________

1. You must use a #2 pencil on the scantron sheet (answer sheet).

2. Check that the cover of your exam booklet is GREEN and that it has Version 11 on the top. Write 11 in the TEST/QUIZ NUMBER boxes and blacken in the appropriate spaces below.

3. On the scantron sheet, fill in your TA’s name (NOT the lecturer’s name) and the course number.

4. Fill in your NAME and PURDUE ID NUMBER and blacken in the appropriate spaces.

5. Fill in the four-digit RECITATION SECTION NUMBER. Your number is a three-digit number. Put a 0 in the front to make it a four-digit number, and then fill it in.

6. Sign the scantron sheet.

7. Blacken your choice of the correct answer in the space provided for each of the questions 1-12. While you mark all your answers on the scantron sheet, you should show your work on the exam booklet. Although no partial credit will be given, any disputes about the grade or grading will be settled by examining your written work on the exam booklet.

8. There are 12 questions, each worth 8 points. The maximum possible score is:

\[(12 \times 8) + 4\text{(for taking the exam)} = 100\]

9. NO calculators, electronic devices, books, or papers are allowed. Use the back of the test for scratch paper.

10. After you finish the exam, turn in BOTH the scantron sheet and the exam booklet.

11. If you finish the exam before 7:25pm, you may leave the room after turning in the scantron sheet and the exam booklet. If you don’t finish before 7:25pm, you should REMAIN SEATED until your TA comes and collects your scantron sheet and exam booklet.
Exam Policies

1. You are assigned an individual seat. Please sit in that seat.

2. Students may not open the exam until instructed to do so.

3. No student may leave in the first 20 minutes or the last 5 minutes of the exam.

4. Students that arrive more than 20 minutes late will not be allowed to take the exam; they will have to contact their lecturer within one day for permission to take a make-up exam.

5. After time is called, the students must put down all writing instruments and remain in their seats, while the TAs will collect the scantron sheet and the exam booklet.

6. Any violation of the above rules may result in a score of zero.

Rules Regarding Academic Dishonesty

1. You are not allowed to seek or obtain any kind of help from anyone or answer questions on the exam. If you have questions, consult only your instructor.

2. You are not allowed to look at the exam of another student. You may not compare answers with anyone else or consult another student until after you have finished your exam, handed it in to your instructor and left the exam room.

3. You may not consult notes, books, calculators. You may not handle cell phones, cameras, smart watches, or any electronic devices until after you have finished your exam, handed it in to your instructor and left the exam room.

4. Anyone who violates these instructions will have committed an act of academic dishonesty. Penalties for academic dishonesty can be very severe and may include an F in the course. All cases of academic dishonesty will be reported immediately to the Office of the Dean of Students.

I have read and understand the exam rules stated above:

STUDENT NAME ____________________________________________________________

STUDENT SIGNATURE _____________________________________________________
Recitation Section numbers by TA:

<table>
<thead>
<tr>
<th>Time &amp; Location</th>
<th>TA name</th>
<th>Section #</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30am in PHYS 110</td>
<td>Connor Thompson</td>
<td>0208</td>
</tr>
<tr>
<td>11:30am in PHYS 110</td>
<td>Connor Thompson</td>
<td>0215</td>
</tr>
<tr>
<td>12:30pm in PHYS 110</td>
<td>Connor Thompson</td>
<td>0222</td>
</tr>
<tr>
<td>4:30pm in PHYS 202</td>
<td>Nikhil Mehra</td>
<td>0229</td>
</tr>
<tr>
<td>3:30pm in PHYS 202</td>
<td>Nikhil Mehra</td>
<td>0236</td>
</tr>
<tr>
<td>2:30pm in PHYS 202</td>
<td>Nikhil Mehra</td>
<td>0243</td>
</tr>
<tr>
<td>10:30am in PHYS 202</td>
<td>Sarah Anderson</td>
<td>0250</td>
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<td>9:30am in PHYS 202</td>
<td>Sarah Anderson</td>
<td>0257</td>
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<td>11:30am in PHYS 202</td>
<td>Sarah Anderson</td>
<td>0264</td>
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<tr>
<td>2:30pm in PHYS 110</td>
<td>Rishab Pandian</td>
<td>0271</td>
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<tr>
<td>1:30pm in PHYS 110</td>
<td>Rishab Pandian</td>
<td>0278</td>
</tr>
<tr>
<td>3:30pm in PHYS 110</td>
<td>Rishab Pandian</td>
<td>0285</td>
</tr>
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<tr>
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<th>Section #</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30am in HAMP 2101</td>
<td>Saikiran Polishetty</td>
<td>0287</td>
</tr>
<tr>
<td>7:30am in HAMP 2101</td>
<td>Saikiran Polishetty</td>
<td>0288</td>
</tr>
<tr>
<td>8:30am in HAMP 2101</td>
<td>Saikiran Polishetty</td>
<td>0289</td>
</tr>
<tr>
<td>8:30pm in PHYS 333</td>
<td>Stian Clem</td>
<td>0290</td>
</tr>
<tr>
<td>7:30pm in PHYS 333</td>
<td>Stian Clem</td>
<td>0291</td>
</tr>
<tr>
<td>9:30pm in PHYS 333</td>
<td>Stian Clem</td>
<td>0292</td>
</tr>
<tr>
<td>3:30pm in PHYS 333</td>
<td>Abishek Srinivasan</td>
<td>0293</td>
</tr>
<tr>
<td>4:30pm in PHYS 333</td>
<td>Abishek Srinivasan</td>
<td>0294</td>
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<tr>
<td>2:30pm in PHYS 333</td>
<td>Abishek Srinivasan</td>
<td>0295</td>
</tr>
<tr>
<td>9:30am in PHYS 110</td>
<td>Rashmi Bhaskara</td>
<td>0296</td>
</tr>
<tr>
<td>7:30am in PHYS 110</td>
<td>Rashmi Bhaskara</td>
<td>0297</td>
</tr>
<tr>
<td>8:30am in PHYS 110</td>
<td>Rashmi Bhaskara</td>
<td>0298</td>
</tr>
</tbody>
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Some formulas that may be useful:

\[
\int \sec(x)\,dx = \ln|\sec(x) + \tan(x)| + C
\]

\[
\int \tan(x)\,dx = -\ln|\cos(x)| + C
\]
1. Evaluate the integral

\[ \int_{0}^{\frac{\pi}{2}} xe^{3x} \, dx \]

A. \( \frac{2e + 1}{9} \)

B. \( \frac{1}{9} \)

C. \( \frac{e^2 + 1}{9} \)

D. \( \frac{1 - 2e}{9} \)

E. \( -\frac{1}{9} \)
2. Evaluate the integral

$$\int_0^\pi x^2 \cos(x) \, dx$$

A. $\frac{\pi^2}{4} - 2$

B. $\pi$

C. $-2\pi$

D. $-\frac{\pi^2}{4}$

E. $-2$
3. Compute

\[ \int \sin^{\frac{1}{2}}(x) \cos^{3}(x) \, dx \]

A. \( \frac{2}{3} \sin^{\frac{3}{2}}(x) + \frac{2}{7} \sin^{\frac{7}{2}}(x) + C \)

B. \( 2 \sin^{\frac{1}{2}}(x) + \frac{2}{5} \sin^{\frac{5}{2}}(x) + C \)

C. \( 2 \sin^{\frac{1}{2}}(x) - \frac{2}{3} \sin^{\frac{3}{2}}(x) + C \)

D. \( -\frac{2}{3} \sin^{\frac{3}{2}}(x) + \frac{2}{7} \sin^{\frac{7}{2}}(x) + C \)

E. \( \frac{2}{3} \sin^{\frac{3}{2}}(x) - \frac{2}{7} \sin^{\frac{7}{2}}(x) + C \)
4. Compute

\[ \int \cos^4(x) \, dx \]

A. \( \frac{3x}{8} - \frac{\cos(2x)}{4} + \frac{\cos(4x)}{32} + C \)

B. \( \frac{3x}{8} + \frac{\sin(4x)}{32} + C \)

C. \( \frac{3x}{8} - \frac{\sin(2x)}{4} + \frac{\sin(4x)}{32} + C \)

D. \( \frac{3x}{8} + \frac{\sin(2x)}{4} + \frac{\sin(4x)}{32} + C \)

E. \( \frac{3x}{8} + \frac{\cos(2x)}{4} + \frac{\cos(4x)}{32} + C \)
5. Compute

\[ \int \tan^2(x) \sec^4(x) \, dx \]

A. \( \frac{\tan^3(x)}{3} - \frac{\tan^5(x)}{5} + C \)

B. \( \frac{\tan^2(x)}{2} + \frac{\tan^4(x)}{2} + \frac{\tan^6(x)}{6} + C \)

C. \( \frac{\tan^3(x)}{3} + \frac{\tan^5(x)}{5} + C \)

D. \( \frac{\tan^2(x)}{2} + \frac{\tan^4(x)}{4} + C \)

E. \( \frac{\tan^3(x)}{3} + \frac{2 \tan^5(x)}{5} + \frac{\tan^7(x)}{7} + C \)
6. Compute

\[ \int_0^{\pi/3} \tan^3(x) \sec(x) \, dx \]

A. \( \frac{1}{3} \)

B. 1

C. \( \frac{2}{3} \)

D. \( \frac{4}{3} \)

E. \( \frac{5}{3} \)
7. Compute

\[
\int_0^{3/\sqrt{2}} \frac{x^2}{\sqrt{9 - x^2}} dx
\]

A. \(\frac{9}{8}(\pi - 2)\)

B. \(\frac{9}{4}\)

C. \(\frac{9\pi}{8}\)

D. \(9\pi\)

E. \(\frac{9}{8}(\pi + 2)\)
8. Compute
\[ \int \frac{dx}{\sqrt{x^2 - 4x + 3}} \]

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

B. \( \sqrt{x^2 + 1} + C \)

C. \( x - 2 + \sqrt{x^2 - 4x + 3} + C \)

D. \( \sqrt{x^2 - 4x + 3} + C \)

E. \( \ln \left| x - 2 + \sqrt{x^2 - 4x + 3} \right| + C \)
9. The proper form of the partial fraction decomposition of the rational function

\[
\frac{x + 1}{x^2(x^2 + 4)(x^2 + 2x + 5)}
\]

is

A. \( \frac{A}{x^2} + \frac{B}{x + 2} + \frac{C}{x - 2} + \frac{Dx + E}{x^2 + 2x + 5} \)

B. \( \frac{A}{x} + \frac{B}{x^2} + \frac{Cx + D}{x^2 + 4} + \frac{Ex + F}{x^2 + 2x + 5} \)

C. \( \frac{Ax + B}{x} + \frac{Cx + D}{x^2 + 4} + \frac{Ex + F}{x^2 + 2x + 5} \)

D. \( \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x + 2} + \frac{D}{x - 2} + \frac{Ex + F}{x^2 + 2x + 5} \)

E. \( \frac{A}{x^2} + \frac{Bx + C}{x^2 + 4} + \frac{Dx + E}{x^2 + 2x + 5} \)

Note: The letters \( A, B, C, D, E, F \) in the partial fractions above represent some appropriate constants.
10. Compute the integral

\[ \int_{4}^{5} \frac{12}{x^2 - 2x - 3} \, dx \]

A. \( 3 \ln \left( \frac{5}{3} \right) \)

B. \( 3 \ln \left( \frac{5}{6} \right) \)

C. \( 3 \ln \left( \frac{12}{5} \right) \)

D. \( 3 \ln (15) \)

E. \( 3 \ln (10) \)
11. Compute

$$\int_{1}^{3} \frac{x^2 - 1}{x^3 + x} \, dx$$

A. $\ln(15)$
B. $\ln\left(\frac{3}{10}\right)$
C. $\ln\left(\frac{10}{3}\right)$
D. $\ln\left(\frac{5}{3}\right)$
E. $\ln\left(\frac{2}{3}\right)$
12. Evaluate the integral 

\[ \int_0^\infty xe^{-x^2} \, dx \]

A. \( \frac{1}{2} \)

B. 1

C. 2

D. The integral is divergent.

E. \( e \)