



## Center for Academic Resources in Engineering (CARE) Peer Exam Review Session

Math 231 – Calculus II

### Midterm 3 Worksheet

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*The problems in this review are designed to help prepare you for your upcoming exam. Questions pertain to material covered in the course and are intended to reflect the topics likely to appear in the exam. Keep in mind that this worksheet was created by CARE tutors, and while it is thorough, it is not comprehensive. In addition to exam review sessions, CARE also hosts regularly scheduled tutoring hours.*

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Tutors are available to answer questions, review problems, and help you feel prepared for your exam during these times:

Session 1: Apr 8, 7-9PM Hriday, Tommy

Can't make it to a session? Here's our schedule by course:

<https://care.grainger.illinois.edu/tutoring/schedule-by-subject>

Solutions will be available on our website after the last review session that we host.

Step-by-step login for exam review session:

1. Log into Queue @ Illinois: <https://queue.illinois.edu/q/queue/844>
2. Click “New Question”
3. Add your NetID and Name
4. Press “Add to Queue”

**Please be sure to follow the above steps to add yourself to the Queue.**

Good luck with your exam!

1. Determine whether the series converges or diverges:

$$\sum_{n=2}^{\infty} \frac{n^2 + 3}{n^3 \ln n}$$

2. Determine whether the series converges or diverges. Note that  $\lim_{n \rightarrow \infty} (1 + \frac{1}{n})^n = e$ .

$$\sum_{n=1}^{\infty} \frac{(n!)^2}{n^{2n}}$$

3. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{5^n}{n + 6^n}$$

4. Determine if the series converges absolutely, converges conditionally, or diverges.

$$\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n}$$

5. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \left(\frac{n^2}{2n^2 + 5}\right)^n$$

6. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{17n^2}{3n^4 - 1}$$

7. Determine if the following series converges absolutely, converges conditionally, or diverges.

$$\sum_{n=1}^{\infty} \frac{(2n+1)(-2)^n}{n!}$$

8. Determine whether the series converges or diverges. Note that  $\lim_{n \rightarrow \infty} (1 + \frac{1}{n})^n = e$ .

$$\sum_{n=1}^{\infty} \frac{n!}{2^n n^n}$$

9. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \left( \frac{3n}{2n+1} \right)^n$$

10. Determine whether the series converges or diverges.

$$\sum_{n=3}^{\infty} \frac{1}{n \ln n \ln(\ln n)}$$