



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

Math 221 – Calculus I

Midterm 4 Worksheet

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.

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

Session 1: November 17, 6:00pm-7:50pm Jiya, Patrick & Emma

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/1056>
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. Complete the following common properties of sigma notations:

#	Expression	Answers
1	$\sum_{i=1}^n c$	
2	$\sum_{i=1}^n ca_i$	
3	$\sum_{i=1}^n i$	
4	$\sum_{i=1}^n i^2$	
5	$\sum_{i=1}^n i^3$	

2. Use both the left-endpoint and right-endpoint approximations to approximate the area under the curve $f(x) = \frac{x^2}{2}$ in the interval $[0, 3]$.

3. If the R is the region bounded above by the graph of function $f(x) = x + 4$ and below by the graph of the function $g(x) = 3 - \frac{x}{2}$ over the interval $[1, 4]$, find the area of region R.

4. If the R is the region bounded by the graph of function $f(x) = \sin(x)$ and $g(x) = \cos(x)$ over the interval $[0, \pi]$, find the area of region R .

5. Given a velocity function $v(t) = 3t - 5$ (in meters per second) for a particle in motion from time $t = 0$ to time $t = 3$, find the net displacement of the particle.

6. A conical water tank has its top at ground level and its base 10 feet below ground. The radius of the cone at ground level is 2 ft. It is filled with water weighing $62.4\text{ lb}/\text{ft}^3$ and is to be emptied by pumping the water to a spigot 3 feet above ground level. Find the total amount of work performed in emptying the tank.