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

Math 241 – Calculus III

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: Saturday - Dec. 7, 4:00-6:00 pm in 3025 CIF, Cami, Gabe

Session 2: Sunday - Dec 8, 5:00-7:00 pm in 3025 CIF, Pallab, Rose, Kewal

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.

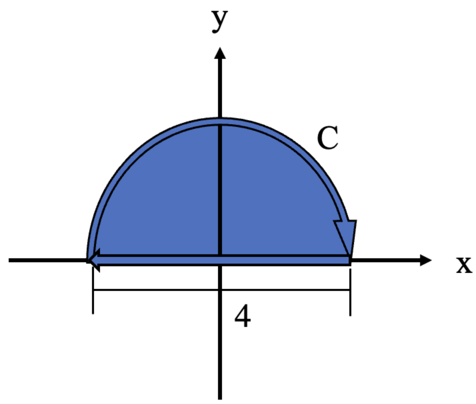
Step-by-step login for exam review session:

1. Log into Queue @ Illinois: https://queue.illinois.edu/q/queue/845
2. Click "New Question"
3. Add your NetID and Name
4. Press "Add to Queue"

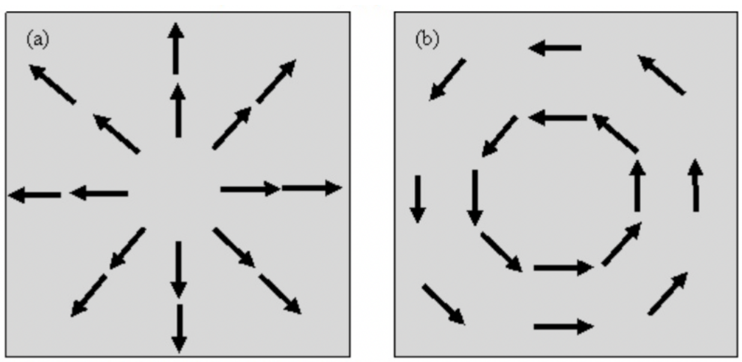
Please be sure to follow the above steps to add yourself to the Queue.

Good luck with your exam!

1. Evaluate $\int_C F \cdot dr$ where $F(x, y) = \langle 3y^2 - \cos y, x \sin y \rangle$ and C is a counterclockwise path shown below.



2. The graph below shows two vector fields. Answer the following questions for each of them.
   (1) Is it a conservative vector field?
   (2) Does it have a positive, negative, or zero curl?
   (3) Does it have a positive, negative, or zero divergence?



3. Evaluate the flux of the vector field $F(x, y, z) = \langle x, y, xy \rangle$ where the surface S is part of the paraboloid $z = 4 - x^2 - y^2$ that lies within $0 \leq x \leq 1, 0 \leq y \leq 1$, and is oriented upwards.

4.. Use Stokes' theorem to evaluate $\int_C \vec{F} \cdot d\vec{r}$ where $\vec{F} = \langle y^2, x, z \rangle$ across the curve C shown in the figure below.