Logistical Information

- 1:30 pm - 3:30 pm Thurs May 18, in OWS 250 (next to Beakers)
- Most problems will be similar to problems on homework, quizzes, and previous exams.
- No calculators, notes, books, cell phones permitted.
- Bring whatever you need to help yourself concentrate for 2 hrs: watch, water bottle, granola bar ...

The final exam is cumulative.

- Consult your review sheets for Exams 1 and 2 for lists of basic facts and formulas to know, topics to know, and review problems for Units 1 and 2.
- Also use the problems from Quizzes 1-6 and Exams 1 and 2 for practice.

Topics from Unit 3: Vector Calculus

- Line integrals: direct evaluation using parametrization and evaluation using FTCLI or Green's Theorem, path-independent/conservative fields vs path dependent fields, circulation along a curve, gradient fields, potential function for a gradient field (Ch 18)
- Flux and flux density (divergence), flux integrals: direct evaluation (by "pure thought", by using a special case, or by parametrization) and evaluation using the Divergence Theorem (Ch 19, S 21.3)
- Circulation density and the curl of a 3D vector field, evaluating line integral in 3D or a flux integral using Stokes' Theorem, the Curl Test, the Divergence Test (Ch 20)

Review Exercises for Unit 3:

- Ch 18 Rev: 1-31, 36-39, 41-47
- Ch 19 Rev: 1-3, 10-20, 30-34, 40, 58
- Ch 20 Rev: 17-22, 26, 31-40

Additional Review Problems:

1. Compute the circulation of $\vec{F} = y\,\hat{i} + z\,\hat{j} + x\,\hat{k}$ around the circle of radius 2 in the lying in the plane $3x - y + 2z = 6$, centered at the point $(0, 0, 3)$, and oriented counter-clockwise when viewed from above.
2. Calculate $\int_C \vec{F} \cdot d\vec{r}$, where $\vec{F} = (x + y)\hat{i} + (x + z)\hat{j} + (y + z)\hat{k}$ and C is a square of side length 2 lying in the plane $3x - y + 2z = 6$, centered at the point $(0, 0, 3)$, and oriented counter-clockwise when viewed from above.
3. Evaluate the line integral of $\vec{F} = (2x + y)\hat{i} + (x - 2y)\hat{k}$ around the parallelogram whose vertices are $(0, -6, 0)$, $(2, 0, 0)$, $(2, 6, 3)$, and $(0, 0, 3)$, traversed in that order.