

### Outline for Exam 3

The exam will cover material from sections 14.1-14.4 (Thursday) and 14.5-14.7 (Friday).  
The topics by section are

- 14.1** Line integrals of functions. Using line integrals to compute masses, first moments, moments of inertia etc.
- 14.2** Vector fields. Line integrals of vector fields. Work, flow, circulation and flux integrals.
- 14.3** Path-independence. Conservative vector fields and potential functions. The component test for two-dimensional conservative vector fields. Exact differential forms.
- 14.4** The divergence of a two-dimensional vector field. The divergence as flux density. The circulation density ( $\text{curl } \vec{F}) \cdot \vec{k}$ . Green's theorem. Green's theorem for a region with holes. Using Green's theorem to find the area of a region.
- 14.5** The area of a surface given parametrically by  $\vec{r}(u, v)$ . The area of a surface given explicitly by  $z = f(x, y)$ .
- 14.6** The flux of a vector field through a surface. Calculation of fluxes for surfaces given parametrically and explicitly.
- 14.7** Stokes' theorem.