This exam covers:

- Differentiability (S 14.8)
- Polar coordinates, polar curves: slope, area, arclength (S 8.3)
- Optimization: finding and classifying critical points, the Extreme Value Theorem, using Lagrange multipliers to find global maxima and minima subject to a constraint (Ch 15)
- Multiple integrals: double integrals in Cartesian and polar coordinates, triple integrals in Cartesian, cylindrical, and spherical coordinates, changing coordinates in a multiple integral using the Jacobian (Ch 16, S 21.2)
- Parametric curves, motion in 3space, vector fields (Ch 17)

Formulas to know:

- Slope of curve in polar coordinates, area enclosed by polar curve, arclength along a polar curve
- Area element for polar coordinates, and volume elements for cylindrical and spherical coordinates
- Jacobian
- Parametric equations for lines and circles

Format of the exam:

- Most problems will be similar to homework problems.
- Calculators will not be permitted; numerical computations will be amenable to hand calculation, at least in my opinion.
- There is one "fill-in-the-blanks" question which tests your knowledge of basic facts and your understanding of key ideas.
- Several questions will test your understanding of the concepts underlying the tools and techniques we have discussed.

Exercises for review, priority in bold:

- **RQ 14.8**
- Ch 8 Review: 60, **61**, 62, **63**, 64
- Ch 15 Review: 1-6, 11-19, **20**
- Ch 16 Review: 1-13, **14**, 15, 16, 21, 24, 25-27, 38, 40, **41**, 59-62, **69**, **70**
- Ch 17 Review: 1-26, 30, 31, 34, 36, **37**, 38-42
- Ch 21 Review: 16, **17**, 18