1. Equations of lines and planes; **Chain Rule**; iterated partial derivatives.

2. Gradient of $f$; Hessian matrix of $f$; **Taylor’s Theorem**, $1^{st}$ and $2^{nd}$ order.

3. Critical points; relative (local) extrema; $2^{nd}$ Partials Test; determining local extrema from basic principles.

4. Constrained extremal problems; Lagrange multipliers.

5. Paths; velocity, speed, tangent vector; acceleration; arc length.

6. Vector fields $\mathbf{F}$; flow lines; divergence of $\mathbf{F}$, curl of $\mathbf{F}$.


8. Double integrals; iterated integrals; changing order of integration; volumes via double integrals.