

Test 3: All Unit 3 notes and posted Unit 3 slides

Basic knowledge

- Differentiation of basic functions ($\sin x$, $\cos x$, e^x , x^p , $\ln x$, \dots); Product, quotient, and chain rule.
- Partial derivatives; Unit vector; Sketching of 2D curves; Sketching of surfaces.
- Integration of basic functions (x^p , e^x , $\sin x$, $\cos x$, \dots); Integration using substitution.
- Vector notation; Dot product; Cross product.

Sec. 14.5-8: Partial derivatives

- Chain rule (Be careful with notation); Implicit differentiation for $F(x, y) = 0$ and $F(x, y, z) = 0$.
- Gradient vector; Directional derivative; Approximating directional derivatives; Minimum and maximum directional derivative; Tangent plane to level surface; Normal line; Tangent line to level curve; ∇f is perpendicular to level curves and level surfaces.
- Critical points on a 2D region; Critical points on a 2D curve; Second derivative test; Absolute maxima and minima on 2D curves; Absolute maxima and minima on 2D regions.
- Lagrange multipliers for one constraint; Constraints with \leq ; Solving non-linear systems.

Ch. 13: Vector Functions

- Vector-valued functions; Domain; Limit; Continuous; Parametrization of curves; Sketching oriented curves.
- Derivatives and integrals of vector functions; Unit tangent; Tangent line; Differentiation rules.
- Arc length; Arc length function; Parametrization w.r.t. arc length; Curvature.
- Velocity; Speed; Acceleration; Newton's 2nd law.

What NOT to know? Things that I didn't discuss during class.

- Proofs.
- Sec. 13.1: Using Computers to Draw Space Curves (p. 851-853).
- Sec. 13.4: Kepler's Laws of Planetary Motion (p. 875-877).
- Sec. 14.5: Tree diagrams.
- Sec. 14.6: Limit definition (p. 946-947, p. 951).
- Sec. 14.7: Example 6.