MVE041 Flervariabelanalys 2015 Passing/Mastery Week 6

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1 Passing Part

§15.3 Line Integrals

- Be able to parameterize simple curves including lines, quadratics, circles, ellipses, and helixes.
- Can compute the arclength of a curve segment in the plane or the room in simple examples such as those listed above.
- For simple curves like those listed above, be able to compute the line integral of a function over the curve.

§15.4 Line Integrals of Vector Fields

- Understand and be able to interpret in physical terms the line integral of a vector field.
- For simple vector fields and simple curves (such as those listed above), be able to compute the line integral of the vector field over the curve.

§15.2 Conservative Fields

- Understand the concept of a conservative field, and be able to give the definition.
- For a conservative vector field $\bar{F}$ with potential ϕ, explain the relationship between the level curves of ϕ and the field lines of $\bar{F}$.
- Know the necessary conditions for a vector field to be conservative, and use these to show that a given vector field is conservative or not.
- Be able to compute the potential of a conservative vector field.

§16.1, 16.2 Div, Grad, and Curl

- Can compute the divergence and curl of a given vector field.
- Understand the intuitive concept of the divergence and the curl of a vector field.

- Understand and give the definition of solenoidal and irrotational vector fields.
- Can apply Theorem 4 page 917 of *Adams and Essex* to show a vector field is conservative.

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2 Mastery Part

§15.2 Conservative Fields

- Can state and prove the path-independence theorem for conservative vector fields (cf. Theorem 1 page 883 of *Adams and Essex*).

§16.1, 16.2 Div, Grad, and Curl

- Can state and prove the vector field identities that say every conservative field is irrotational, and the curl of any vector field is solenoidal (cf. page 915-917 of *Adams and Essex*).