

MA286 Analysis I – Assignment 3

November 7, 2012, Lecturer: Claas Röver

QUESTION 1. Calculate the line integral $\int_C f(x, y) ds$ in the following cases.

(a) $f(x, y) = x\sqrt{1+4y^3}$, where C is the curve $y = x^2$ from $(0, 0)$ to $(1, 1)$.

(b) $f(x, y) = xy + 2$, where C is the upper half of the circle of radius 2 about the origin.

QUESTION 2. Evaluate $\int_0^1 \int_0^3 e^{x+3y} dx dy$ and $\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{y^3+1} dy dx$.

QUESTION 3. Evaluate $\iint_D \sqrt{x^2 - y^2} dA$ where $D = \{(x, y) \mid 0 \leq x \leq 2, 0 \leq y \leq x\}$, and also

$\iint_R x \sin(xy) dA$ where $R = \{(x, y) \mid 0 \leq x \leq \pi, 1 \leq y \leq 2\}$.

QUESTION 4. For each of the functions $f(x, y) = x^3y + 12x^2 - 8y$ and $g(x) = y^2 - 2y \cos(x)$, find the local extrema and saddle points with the help of its Hessian matrix.

QUESTION 5. Calculate the volume of the solid bounded by the plane $x + 2y + 3z = 15$ and the coordinate planes.

Hand in your solutions at the beginning of the lecture on Monday, 19 November 2012.