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 cirlce of radius 2 about the origin.

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

QUESTION 3. Evaluate $\displaystyle\iint_D \sqrt{x^2-y^2}\,dA$ where $D = \{(x,y) \mid 0 \le x \le 2,\, 0 \le y \le x\}$, and also $\displaystyle\iint_R x\sin(xy)\,dA$ where $R = \{(x,y) \mid 0 \le x \le \pi,\, 1 \le y \le 2\}$.

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 cordinate planes.

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