Exam test C

Mathematics 2, SS 2017/18

1. (15 points) Compute $\det(AB)$ where

$$A = \begin{pmatrix} 1 & 2 & 3 & 45 \\ 6 & 7 & 8 & 90 \\ 3 & 2 & 2 & 32 \\ 3 & 2 & 2 & 21 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & \frac{1}{2} & \frac{1}{3} & \frac{1}{5} \\ 1 & 1 & 7 & 0 \\ 1 & 17 & 0 & 0 \\ 0 & 10 & 0 & 0 \end{pmatrix}.$$

2. (15 points) Compute the Riemann integral

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} e^{2\sin x}(\sin x + 1)\cos x \; dx.$$

3. (20 points) Find supremum and infimum (and maximum and minimum if they exist) of the function f on the set M, where

$$f(x,y,z) = 3y - x + 5z, \qquad M = \{[x,y,z] \in \mathrm{R}^3 : \; z = x^2 + (x-y)^2, \; z \leq 13\}.$$

Explain in detail why maximum and minimum exist (if they exist).