# Exam test A

## for Mathematics 2, SS 2017/18

**1.** (15 points) Decide for which numbers $x \in \mathbb{R}$ is the matrix $A$ invertible. For such $x$ compute $A^{-1}$.

$$A = \begin{pmatrix} 1 & 2 & 5 \\ 2 & 3 & -1 \\ -2 & -3 & x \end{pmatrix}.$$

**2.** (15 points) Compute the antiderivative on $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

$$\int \frac{\sin x \cos^2 x}{3 + \sin^2 x + 3 \cos x} \, dx.$$

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

$$f(x, y, z) = 2x - y - 2z, \qquad M = \{[x, y, z] \in \mathbb{R}^3 : z^2 = x^2 + 2y^2, \ 0 \le z < 18\}.$$