

**Homework 7: Euclidean spaces**  
**Due Thursday March 23 at 10pm on Canvas.**

1. Problem 8.1 from Janisch
2. Problem 8.2 from Jänisch, but there is a typo in the matrix  $A$  – it should be symmetric, i.e.,  $a_{23}$  should be 1, not 0)
3. Problem 2 chapter 15 (p. 129) from Curtis
4. Problem 6 chapter 15 (p.129) from Curtis
5. (a) Prove that for any real numbers  $a_1, \dots, a_n$  satisfying  $a_1 + \dots + a_n = 1$ , we have

$$a_1^2 + \dots + a_n^2 \geq \frac{1}{n}.$$

- (b) Find the minimum of the function  $f(x_1, \dots, x_n) = x_1^2 + \dots + x_n^2$  on the hyperplane  $x_1 + \dots + x_n = 1$ .
6. Find the maximum of the function  $x + 2y + 3z$  on the unit sphere  $x^2 + y^2 + z^2 = 1$ .