

## Math G2 Mock midterm 2

1. (Practice 6. Ex. 16.) Determine the convergence of the following series! (4 points)

$$\sum_{n=3}^{\infty} \left( \frac{n}{n-1} \right)^n \frac{1}{2^n}.$$

2. (Practice 7. Ex. 6.) Determine the Taylor series of the following function and the corresponding interval of convergence! (4 points)

$$f(x) = \sin(x) \cos(x).$$

3. (Practice 8. Ex. 6.) Calculate the Fourier sine series of the function  $f(x) = \cos(x)$ ,  $x \in (0, \pi)$ . (4 points)

4. (Practice 9. Ex. 4.) Calculate the following limit! (4 points)

$$\lim_{(x,y) \rightarrow (0,3)} \frac{\sqrt{x^2 + y^2 - 6y + 10} - 1}{x^2 + y^2 - 6y + 9}$$

5. (Practice 10. Ex. 6.) Calculate the local extrema of the following function! (4 points)

$$f(x, y) = 2x^3 + y^3 + 3x^2 - 3y - 12x - 4.$$