VU University Amsterdam	Calculus 1, Second Test
Faculty of Sciences	24-10-2014
Department of Mathematics	8.45 am - 10.45 am

The use of a calculator, a book, or lecture notes is not permitted.
Do not just give answers, but give calculations and explain your steps.

1. (6 points)
   Consider the function $f : [-3, 3] \to \mathbb{R}$ given by:

$$f(x) = \frac{\sqrt{x^2+1}}{x^2+3}.$$

   Find the absolute extreme values of f on $[-3, 3]$.

2. (4 points)
   Calculate:

$$\lim_{x \to 0} \frac{1 - \cos x}{x^2}.$$

3. (5 points)
   Find $P_3(x)$, the third-order Maclaurin-polynomial of $f(x) = \arccos x$.

4. (4 points)
   The function $f : \mathbb{R} \to \mathbb{R}$ is defined by:

$$f(x) = x^2 \int_{\frac{1}{4}\pi^2}^{x^2} \frac{\sin\sqrt{t}}{t}\, dt.$$

   Calculate $f'(\frac{1}{2}\pi)$.

(Please turn over)

5. (13 = 3+3+3+4 points)
   Calculate:

   a) $\int (x+3)e^{2x}\,dx.$

   b) $\int_2^3 \frac{1}{x\sqrt{\ln x}}\,dx.$

   c) $\int_0^3 (1-|x-1|)\,dx.$

   d) $\int \frac{3}{x^2+x-2}\,dx.$

6. (4 points)
   Determine if the following integral is convergent or divergent. Motivate your answer.

$$\int_1^\infty \frac{1}{xe^x}\,dx$$

Final score: $1 + \frac{\#\text{ points}}{4}$.