UNIVERSITEIT VAN AMSTERDAM
Admission test mathematics for: Bachelor Actuarial Science & Econometrics.

log means: the common logarithm, so with base 10.
ln is the natural logarithm, so with base $e \approx 2.718$ and $\pi \approx 3.14$

1. Solve the next equations:
   a) $-2\log_5 x + 5\log_{25} x = 2$ b) $\sqrt{x-1} - x = -7$

2. Solve the next inequalities:
   a) $\dfrac{-x+9}{x-1} \geq x$ b) $\log(3-2x) < 1$

3. Let $f(x) = \dfrac{\cos x}{2+\sin x}$ with domain the closed interval: $0 \leq x \leq 2\pi$.
   a) Find the equation of the tangent line at the graph of the function where $x = \pi$
   b) Find the stationary points of *f*, so solve: $f'(x) = 0$.
   c) Make a sign chart (sign diagram) for f' on the domain and find all extreme values of *f*. Say: local/global and maximum/minimum.
   d) Find the range of the function *f*.

4. Let $f(x) = \dfrac{2x^2 - 3x}{e^x}$.
   a) Find the equation of the tangent (line) at the graph of *f* in the point where $x = 1$.
   b) Find and classify the extreme values.
   c) Find the interval(s) on which the graph of the function is convex.

5. a) Find $\int_{-2}^{1} \dfrac{x^2}{\sqrt{2-x}}\,dx$ b) Find $\int_{0}^{2} \dfrac{1}{1+e^x}\,dx$

6. a) Solve the system of equations: $\begin{aligned} x^2 + y^2 &= 25 \\ 3x - 4y &= 0 \end{aligned}$
   b) Find the area of the surface in the (x,y)-plane that satisfies both inequalities:
   $(x^2 + y^2 \leq 25) \wedge (3x - 4y \leq 0)$

7. Find $\int_{-1}^{-0.5} \dfrac{e^{1/t}}{t^2}\,dt$

Points: 10, 10, 20, 20, 20, 10, 10.