1. Consider a function
$$f(x) = \sqrt{x^2 - 4x + 3}$$

   (a) Find a domain of f (i.e., all x for which f is well defined).

   (b) Compute f'.

   (c) Find a domain of f'.

   (d) Compute f''.

2. Integrals:

   • Compute
   $$\int \frac{1}{x-1} \, dx.$$

   • Compute
   $$\int \frac{1}{x^2 + 2x + 2} \, dx.$$

   • Use the previous result in order to compute
   $$\int \frac{x^2 + 5x + 9}{x^3 + x^2 - 2} \, dx.$$

3. Find all solutions to the equation
$$y' = y(100 - y).$$

   Then, find a particular solution which fulfills $y(0) = 50$.

4. Consider an equation
$$y''' + y' = 3x$$

   (a) Find all solution to the appropriate homogeneous problem.

   (b) Use a 'special right hand side' method to deduce one particular solution.

   (c) Write all solutions to the given problem.