

MAT 1001, Høsten 2010

Oblig 2

Hand in by thursday november 11. 2.30PM

You may cooperate on solving the problems, but all students must hand in their own version. Don't forget to write your name and the course code (MAT 1001). Please deliver your solution to the "oblig box" on the 7th floor in Niels Henrik Abels hus. Use the approved front page which can be found by the box or be printed out from the page "Informasjon om obligatoriske oppgaver". To pass, 50% correct answers is required and you have to make an attempt on all problems. Every question is awarded a score of 0 to 10 points, so the maximal score is 100 points. To pass, you need 50 points.

Oppgave 1. Consider the inhomogeneous second order difference equation

$$x_{n+2} + x_{n+1} - 2x_n = 6n + 10$$

for $n \geq 0$.

- Find the general solution x_n^h of the corresponding homogeneous equation.
- Find a particular solution x_n^s of the inhomogeneous equation and find the general solution of the inhomogeneous equation.
- Find the solution that satisfies $x_0 = x_1 = 2$.

Oppgave 2.

- Compute $\int \frac{x-2}{x(x-1)} dx$.
- Solve the differential equation

$$x(x-1)y' + (x-2)y = 2(x-1)^2.$$

Which solution is defined for all x ?

- Find a solution such that $y(2) = 2$.

Oppgave 3.

- Compute $\int \frac{3x^2}{2\sqrt{x^3+1}} dx$.
- Find y such that

$$2y' \sqrt{x^3+1} + 3x^2(y-1)^2 = 0$$

and $y(2) = 5/4$.

Oppgave 4.

- Compute $\int \ln(x^2-1) dx$.
- Compute the amplitude, period og acrophase of the harmonic oscillation

$$f(x) = -3\cos(3x) + \sqrt{3}\sin(3x).$$