Exam: Mathematics 2

Result: .... of 100 points   Mark: .... points.

Problem 1 (20 points)

Solve the following integral: $\int \dfrac{6 - 4x}{x^3 - 6x^2 + 11x - 6}\,\mathrm{d}x$

Problem 2 (10 points)

Evaluate the gradient of the following function: $f(x, y, z) = \sqrt{x^2 + y^2 - z^2}$

Problem 3 (28 points)

For the differential equation $\quad y''' + 11y' = 6(y'' + y) + 5\cos(x) \quad$ find the general solution $y(x)$.

Problem 4 (12 points)

For $\quad y(x) = ax^2 + bx + 1 \quad$ with a and b being parameters create the differential equation with $y(x)$ as solution.

Problem 5 (15 points)

For the probability density function $f(x) = \begin{cases} 3x^2 & \text{for } 0 \leq x < 1 \\ 0 & \text{else} \end{cases}$ find expectation and variance.

Problem 6 (15 points)

You are invited to a party for which Judy baked n_1 biscuits of which s_1 bear a surprise whereas John prepared n_2 biscuits of which s_2 contain a surprise.

a) Taking a biscuit what is the probability that it has been baked by Judy?

b) What is the probability that it has been baked by John?

c) What is the probability to find a surprise?

d) Once you found a surprise by which probability has it been provided by Judy?

e) For $n_1 = 120$, $n_2 = 80$, $s_1 = 10$ and $s_2 = 8$ find the values for a) to d).