Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4110, Fall 2012, Test 10, week 44

Exercise group number:

Name:

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You have 20 minutes to solve the 4 problems. Each problem is worth 10 points, and you need at least 20 points to pass the test. Your answers must be written on this sheet of paper (you can use additional sheets if you need more space for your answers). You are allowed to use a Citizen SR-270X or Hewlett Packard HP30S calculator, and Rottman's "Matematisk formelsamling", but no books or notes.

Problem 1   The set $\mathcal{B} = \{1 + t^2, t + t^2, 1 + 2t + t^2\}$ is a basis for $\mathbb{P}_2$. Find the coordinate vector $[\mathbf{p}]_{\mathcal{B}}$ of $\mathbf{p}(t) = 3t - 4$ relative to $\mathcal{B}$.

Problem 2   Let $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & -6 & 5 \\ 0 & 0 & 4 \\ -1 & 3 & -3 \end{bmatrix}$. Find bases for $\text{Col}(A)$, $\text{Row}(A)$, and $\text{Nul}(A)$.

Problem 3   Let A be a 10×5 matrix. Suppose that $A \begin{bmatrix} 1 \\ 2 \\ 0 \\ 0 \\ 0 \end{bmatrix} = \mathbf{0}$. What is the highest possible rank of A?

Problem 4   A very simple weather model says that if it is raining one day, then there is a 80% chance that will also rain the next day, and that if it not raining, then there is a 50% chance that will rain the next day. According to this model, what is the probability that it will rain on a given day?