Math 524 Exam 2: 9/16/8
Please read the exam instructions.

Notes, books, papers, calculators and electronic aids are all forbidden for this exam. Please write your answers on **separate paper**, indicate clearly what work goes with which problem, and put your name on every sheet. Cross out work you do not wish graded; incorrect work can lower your grade, even compared with no work at all. Keep this list of problems for your records. Show all necessary work in your solutions; if you are unsure, show it. Each problem is worth 10 points. You have approximately 30 minutes.

All problems are for the vector space $\mathbb{R}_2[t]$, real polynomials of degree at most 2. We define $V = \{p(t) : p(1) = 0\}$, a subspace of $\mathbb{R}_2[t]$.

1. Let $A = \{a_1, a_2\}$ for $a_1 = t - 1, a_2 = t^2 - 1$.
   Let $B = \{b_1, b_2\}$ for $b_1 = t^2 + t - 2, b_2 = t^2 + 2t - 3$.
   Prove that A and B are each bases of V.

2. Calculate $[3t^2 - 5t + 2]_A$.

3. Calculate P_{BA}.

4. Use the results of the previous two problems to calculate $[3t^2 - 5t + 2]_B$.

5. Let $W = \{at : a \in \mathbb{R}\}$. This is a subspace of $\mathbb{R}_2[t]$. Prove that $\mathbb{R}_2[t]$ is the internal direct sum of V and W.