

**Bus Ad 239B–Spring 2002**  
**Problem Set 10**  
**Due Thursday April 10**

1. Suppose  $W$  is a  $K$ -dimensional Wiener process, and  $N \geq 0$  is an integer.
  - (a) Let  $\Pi(\omega, t) = 1$  for all  $(\omega, t)$ . Find all  $(N + 1)$ -dimensional securities processes  $\bar{S}$  such that  $\Pi$  is a state price process for  $\bar{S}$ .
  - (b) Let  $\Pi(\omega, t) = e^{-rt}$ ,  $r$  a constant. Find all  $(N + 1)$ -dimensional securities processes  $\bar{S}$  such that  $\Pi$  is a state price process for  $\bar{S}$ .
  - (c) Let  $\Pi(\omega, t) = e^{-\lambda\lambda^T t/2 - \lambda W}$ ,  $\lambda$  a constant  $K$ -dimensional row vector. Find all  $(N + 1)$ -dimensional securities processes  $\bar{S}$  such that  $\Pi$  is a state price process for  $\bar{S}$ .
2. The assumption that  $\tilde{\sigma}$  has rank  $N$  in Proposition 4.5 implies that  $N \leq K$ . Formulate and prove a result showing that for a “typical” securities price process  $\bar{S}$  with  $N > K$ , there is no state price process.