

## Problem 86

$X_n$ : number of pensions to be provided to  $n^{\text{th}}$  individual

	Condition	Pensions	Probability
$X_n =$	Leave before retirement	0	$1 - .4 = .6$
	Remain and single	1	$.4(.25) = .1$
	Remain and married	2	$.4(.75) = .3$

$$E(X_n) = 0(.6) + 1(.1) + 2(.3) = .7$$

$$E(X_n^2) = 0(.6) + 1(.1) + 4(.3) = 1.3$$

$$V(X_n) = 1.3 - (.7)^2 = .81$$

$$S = X_1 + X_2 + X_3 + \dots + X_{100}$$

$$E(S) = E(X_1) + E(X_2) + \dots + E(X_{100})$$

$$= 100 \cdot E(X_n)$$

$$= 70$$

$$V(S) = V(X_1) + V(X_2) + \dots + V(X_{100})$$

$$= 100 \cdot V(X_n)$$

$$= 81$$

\* Because  $X_n$ 's are identical  
and independent

$P(S \leq 90.5)$  by Continuity correction

$$P(Z \leq \frac{90.5 - 70}{\sqrt{81}}) = P(Z \leq 2.28)$$

$$= .99$$

$\square$