## Massachusetts Institute of Technology

## Department of Electrical Engineering & Computer Science

## 6.041/6.431: Probabilistic Systems Analysis (Fall 2002)

## Recitation 13 Answers

- 1. (a)  $var(L) = var(H) = \frac{15}{2}$ . Given 40 bananas, we have H = 40 L which implies their variances will be equal.
  - (b) i.  $\mathbf{E}[W] = 200$ ,  $var(W) = \frac{160}{3}$ 
    - ii. Let A = additional information, then E[W|A] = 190, var(W|A) = 20.
    - iii. The additional information reduces our uncertainty about the total weight, so we get a lower variance. We also get a lower expectation because, based on the original distribution, 15 light bananas are more light bananas than we would expect out of 40 samples.
  - (c) k ≥ 2134 (Approximation using CLT)
- 2. (a)  $\mathbf{E}[Y_n] = \mathbf{E}[Z_n] = 0$ ,  $var(Y_n) = 16n^2$ ,  $var(Z_n) = 16n$ 
  - (b) ½ (exactly)
  - (c) 0.484 (Using CLT with Half-step approximation)
- 3. Practice Problem:
  - (a) w ≤ 190
  - (b) n ≥ 421