2.830J / 6.780J / ESD.63J Control of Manufacturing Processes (SMA 6303)
Spring 2008

Part 1 — Solutions removed due to copyright restrictions.

Part 2

(a) If yield of individual amplifiers is 99.5%, the yield of a memory block with 256 amplifiers each of which must function is $(0.995)^{256} = 27.7\%$. This is the functional yield of chips containing one memory block each.

(b) If there are four memory blocks per chip, the functional yield is $(0.277)^4 = 0.6\%$.

(c) If the memory block can be reconfigured to function with 25 or fewer defective amplifiers, the yield is now:

$$\sum_{k=0}^{25} {}^{256}C_k (0.995)^{256-k} (0.005)^k$$

We can use a Poisson approximation to this binomial distribution to ease evaluation, where $\lambda = 0.005 \times 256 = 1.28$.

Then the yield is given by

$$\sum_{k=0}^{25} \exp(-\lambda) \lambda^k / k! \approx 1$$