

Problem Set 6 (mOrE oN eNtrOPy)

1. Do problem 20-14 in McQuarrie and Simon.
2. Do problem 20-17 in McQuarrie and Simon.
3. Do problem 20-18 in McQuarrie and Simon.
4. Do problem 20-19 in McQuarrie and Simon.
5. Do problem 20-31 in McQuarrie and Simon.
6. Do problem 20-37 in McQuarrie and Simon.
7. 10 points extra credit: Maximum Entropy in Las Vegas  
You play a slot machine in Las Vegas. For every \$1 coin you insert there are three outcomes:
  - a) you lose \$1.
  - b) you win \$1, so your profit is \$0.
  - c) you win \$5, so your profit is \$4.

Suppose you find that your average expected profit over many trials is \$0 (i.e. you play slots at a casino owned by someone exceedingly generous or stupid). Find the maximum entropy distribution for the probabilities  $p_1$ ,  $p_2$  and  $p_3$  of observing each of these three outcomes.