401 Midterm 1 Solution

1. (16 pts) $\emptyset$, $\{0\}$, $\{1\}$, $\{2\}$, $\{3\}$, $\{0,1\}$, $\{0,2\}$, $\{0,3\}$, $\{1,2\}$, $\{1,3\}$, $\{2,3\}$, $\{1,2,3\}$, $\{0,2,3\}$, $\{0,1,3\}$, $\{0,1,2\}$, S.

2. (16 pts) $S = \{x : x = 25y + 10z, x + y \leq 10\}$.

3. (17 pts) $\frac{4!}{4} = 3! = 6$.

4. (17 pts) If I roll a 1 or a 6, you cannot win. If I roll a 2 or a 5, you can win with $\frac{8}{36}$ probability. If I roll a 3 or a 4, you can win with $\frac{12}{36}$ probability. So the final answer is $\frac{1}{3} \cdot \frac{2}{9} + \frac{1}{3} \cdot \frac{1}{3} = \frac{2}{27} + \frac{3}{27} = \frac{5}{27} = 0.185$.

5. (17 pts) $\frac{\binom{10}{5}0.2^5 0.8^5 + \binom{9}{4}0.2^4 0.8^5 + \binom{9}{5}0.2^5 0.8^4}{2} = 0.0545$.

6. (17 pts) You could get a sum of 7 in the following four ways, $\{1,1,5\}$, $\{1,2,4\}$, $\{1,3,3\}$, $\{2,2,3\}$. Of which two has a median of 2. Therefore $\frac{1}{2}$.