MAD 4302 Sept 11, 2013
Quiz I and Key Prof. S. Hudson

1) [30 points] Suppose a game of Nim starts with three piles, with sizes 2, 4 and 8. What is Player One's best move ?

2) [35 points] How many ways can a 2x8 board be tiled with dominoes ?

3) [35 points] How many odd numbers from 1001 to 9999 have four distinct digits ?

Remarks and Answers: This was an easy short quiz, about 20 minutes. There were a few low scores, but there were about 10 perfect scores, which must be a record. It is difficult to propose any meaningful scale, but roughly:

A's 90-100
B's 80-89
C's 70-79
D's 60-69

Most likely, the other quizzes will be harder, with lower averages and lower scales.

1) Player One should remove two from pile 3, the one with 8 coins, to balance the game.

2) 34. Solve this by recursion as done in class. The Fibonacci numbers answer these for various sizes.

3) $5 \cdot 8 \cdot 8 \cdot 7$, but for full credit include some explanation, such as

Decision 1 is the 4th digit. $n_1 = 5$.
Decision 2 is the 1st digit. $n_1 = 8$ (can't match the fourth, nor 0).
Decision 3 is the 2nd digit. $n_1 = 8$. (can't match the first or fourth, but 0 is OK).
Decision 4 is the 3rd digit. $n_1 = 7$.

I gave partial credit for plausible answers with some reasonable and clear plan. People who set digit 3 as decision 2 often got $5 \cdot 9 \cdot 8 \cdot 6$. Can you find the error in this ?

See page 33.