EECS210 **HW#7** **Due: 11-21-17**

1. (10) Using induction, prove that $2^n > n^2$, $\forall n \in N$, $n > 4$.

2. (10) Do Problem 6 on Page 329.

3. (15) Do Problem 8 on Page 329.

4. (15) Do Problem 16 on Page 330.

5. (15) Do Problem 12 on Page 342.

6. (15) Recall that in defining the Fibonacci Sequence Number $\{f_i\}_{i=0}^{\infty}$, we have

$$f_0 = 0,\ f_1 = 1,\ f_n = f_{n-1} + f_{n-2}, \forall n > 1.$$

Prove by using induction on n that

$$\begin{bmatrix} f_n \\ f_{n+1} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}^n \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \forall n \geq 1.$$

7. (20) Given the following recurrence equation

$$T(9) = 1,$$

$$T(n) = 9T(\frac{n}{3}) + n - 8, n = 3^k > 9.$$

   (a) Using the method of repeated substitutions, compute T(n) in closed-form. Remark: You must show at least three substitutions and the general pattern for T(n) clearly for credit.

   (b) Verify the correctness of your solution T(n) using induction.