Math 344 Quiz 4

Names: ______________________________

1. Use the normal equation[1] to find the function $f(x) = a2^x + b2^{-x}$ that best fits $\{(0,0), (-1,1), (1,2)\}$.

2. Use the normal equation to find the single number $f(x) = a$ that best fits $\{(x_1, y_1), \cdots, (x_n, y_n)\}$.

[1] The normal equation is $(V^\top V)^{-1} V^\top \mathbf{y}$

3. Find the function of the form $ax + bx^3$ in $PS[0,1]$ closest to x^2.

4. Let $p_k(x)$ be the k^{th} Legendre polynomial. Show when $j \neq k$

$$\left\langle p_k\left(\frac{2x-a-b}{b-a}\right), p_j\left(\frac{2x-a-b}{b-a}\right)\right\rangle = 0.$$

where the inner product is defined for functions in $PS[a,b]$.