Name: ____________________________________

Math 415, Summer II 2013

Quiz #5 (Take-home): Due 08–14–13, 5PM.

For each of the following questions, precisely state an argument justifying your reasoning. You may *discuss* these problems with other students in the class only. Each write-up should be in your own words and written *by yourself.*

1. Fit a linear function of the form, $p(t) = c_0 + c_1 t$ to the data points $(0, 3), (1, 3), (1, 6)$ using least squares. Sketch your solution.

2. Consider the space $\mathbb{R}_1[t]$ of polynomials of degree at most one. Define an inner product on this space by

$$\langle f|g\rangle := \frac{1}{2}\left(f(0)g(0) + f(1)g(1)\right).$$

Find an orthonormal basis for this inner product space.

3. Suppose $\mathcal{B} = \{\mathbf{b}_1, \ldots \mathbf{b}_m\}$ is a collection of non-zero orthogonal vectors in an inner product space V. Show that $\mathcal{B}$ is linearly independent. Show, by example, that the converse is not true.