Exam 4 Solutions Commentary

Problem 1

- When given data points like this, watch out for tricky numbering. The problem tells you to let $t = 0$ represent 2000, with later years counting up from there.
- Be wary of data that counts up deceptively; i.e.:

(0, 3) (1, 6) (2, 15) (3, 41) (5, 180) (6, 403)

- The number of columns in matrix A corresponds to the degree of the polynomial you're asked to find + 1. i.e. a quadratic (degree 2) has 3 columns; a cubic would have 4 (for x^0, x^1, x^2, and x^3).

Problem 2

- When finding an orthogonal basis, up until the very last step (normalization) you are allowed to multiply the vectors in the basis by whatever scalars you want. Use this to your advantage; lessen numbers and get rid of fractions where you can.
- Normalize the vectors **last**. You will have disgusting numbers if you do it first.

Problem 3

- When checking for an orthogonal set, look at every pair of vectors. If you get an inner (dot) product of 0 for all pairs, the set is orthogonal.
- When checking for an orthonormal set, look at every vector. If all of their magnitudes are 1, the set is orthonormal.
- **A set can't be orthonormal unless it's orthogonal. Check orthogonality first.**

Problem 4

- Don't forget the power rule!

Problem 5

- With matrices A and b stored as [A] and [B] in your calculator:

$(([A]^T[A])$^(-1))$[A]^T[B]$ --> [C]

will store the least squares solution in [C]. The arrow is the STO key (above ON).

Problem 6

- When taking the norm for an inner product that's not the standard Euclidean:

$$||\boldsymbol{u}|| = \sqrt{\langle \boldsymbol{u}, \boldsymbol{u} \rangle}$$