Comments about the homework assignments and the first test.

The first test focuses on the main items: Using vectors and their products to calculate geometric quantities and for geometric reasoning, and calculus of parameterized curves. It will be closer to what we did in class than to the textbook exercises, but all material is discussed in the textbook. Specific items to look at in detail:

- Geometric view of vector addition and scalar multiples.
  Fun sample exercise: What is the longest vector that one can obtain by adding a subset (your choice!) of the (unit) vectors going to the hours in an analog clock (this is quite hard!). How does the answer change if one can only use (any subset of) the vectors going to the even hours?

- Use dot and cross products to calculate angles between lines and between planes, areas of triangles, equations of planes, distances between any combination of one or two points, lines, planes. The pyramid used in class provides good practice for all.

- For parameterized curves in the plane and 3-space, calculate velocity, speed, arclength, acceleration, unit tangent, principal normal, and binormal vector, the components of the acceleration parallel and perpendicular to the velocity. MK likes Lissajous figures (as in class) better than those with polynomial formulas etc. Make sure you know your sines and cosines, including double angle formulas etc.

Related exercises from the homework ask when some vectors are parallel or perpendicular to each other, or to some plane or line, and when something has a minimum or maximum value. That provides for good calculus I practice. Since we do not count on having computers available, expect that some equations or integrals just have to remain unsolved / unevaluated.

- Some formal arguments involving derivatives of products and interpreting that derivatives of constants are zero, dot products of perpendicular vectors are zero etc., compare theorem 2.4. in 11.2 (p, 871) and exercise 11.2 / 49, and exercises 11.4 / 41 - 44.

- You are not expected to memorize the many formulas for curvature and many other items in chapter 11.

- This test is staying away from arguments involving reparameterizations and the chain rule. (But eventually this will be required material.)

A few comments about some assigned homework exercises from the textbook.

- Basic conceptual understanding, writing: 11.2 / W3. Don’t undervalue this.

- Keeping calculus skills sharp: 11.2 / 3, 13, 32, and 11.5/ 22. (Boring, but we need to do this.)

- Some geometric applications: 11.2 / 41, 49 and 11.5 / 16, 18 (good test material).

- Applications for which we did not have enough time, but which should be easy to read about. Mainly calculus I review: 11.3 / 31, 32, 37, 39, 40, 47, 48. Hopefully reasonably interesting, but not the focus on the test.

  Enjoy the applications and discussions involving the Magnus force – but the test 1 has NO questions about it, or about Coriolis and centripetal forces etc.

- 11.4 / 8, 12, 26, 30. Look up formulas for curvature and practice calculations. On the test we will NOT do really messy things since our computers do not work

- Deeper understanding / calculations with general functions: 11.5 / 25 - 28 (explain why), 11.5 / 41 - 44.

On Monday afternoon I will be in my office PSA 211 for regular office hours, and further appointments if needed. Have a great weekend.