Lecture 9: More Curves and Coaster Physics – Review Questions

- Write the matrix form for the Bezier spline and B-spline.
- How can we tell if a curve will stay within the convex hull of the control points? Which of the cubic splines we study have this property?
- Define the term 'continuity' as used to describe splines in computer graphics. What are C^0, C^1, C^n, C^∞ continuity? What is G^1 continuity? Give an example where G^1 continuity differs from C^1 continuity.
- Describe the differences between Hermite splines, Bezier splines, and B-splines.
- Demonstrate that a cubic B-spline has C^2 continuity at the join point between two sequential cubic segments.
- Assume frictionless motion along the roller coaster track under the influence of gravity. Show that we can obtain velocity for a particle traveling along the track using the principle of conservation of energy.
- Knowing the velocity of the particle on the roller coaster track gives us distance traveled over a small timestep. How do we convert this distance traveled to a change in the parameter u with which the roller coaster curve is parameterized?

Bonus:

- How can you construct a C^∞ spline that interpolates a given set of control points? What are the advantages and disadvantages of such a spline for use in computer graphics?