1. A degree three B-spline curve \( q(u) \) has knot vector \( [0, 0, 0, 1, 2, 3, 4, 4, 4] \) with 12 knots. It has 8 control points \( p_0 - p_7 \).
   a. What is the knot vector for \( q'(u) \) as a degree two B-spline? How many control points does it have?
   b. Give formulas for \( q'(0), q'(3) \) and \( q'(4) \) in terms of the \( p_i \)'s. [Hint: This should not require extensive computation.]
   c. Give a formula for \( q''(2) \) in terms of the \( p_i \)'s.
   d. Is it possible that \( q''(u) \) is discontinuous at \( u = 2 \). At \( u = 3 \)?

2. What new material properties are used in (basic) ray tracing that were not already used in the Phong local lighting model? Give a short (one sentence at most) description of each one. Can they have separate values for red, green and blue?

3. Answer the following multiple choice—true/false questions a.-i. about geometry shaders. Answer the cases under the assumption that the shader program has a geometry shader. We may not have covered all these topics explicitly, but answer according to what would make the most sense in terms of how geometry shaders work.
   a. A geometry shader can take as inputs any one of points, lines, line strips, triangles, triangle fans, or triangle strips.
   b. A geometry shader that takes lines as inputs can output triangle strips. (True/False)
   c. The only way a geometry shader can output a triangle fan is to output it as multiple triangle strips. (True/False)
   d. The input primitives to a geometry shader can be which of the following types: points, lines, line strips, line adjacencies, triangles, triangle fans, triangle strips, triangle adjacencies?
   e. The output primitives from a geometry shader can be which of the following types: points, lines, line strips, line adjacencies, triangles, triangle fans, triangle strips, triangle adjacencies?
   f. A geometry shader can change the value of a uniform variable. (True/False)
   g. A geometry shader can access all vertex attributes, even vertex attributes that the vertex shader did not copy into “out” variables. (True/False)
h. The vertices output by the geometry shader might be processed by a vertex shader before being sent to the fragment shader.

i. The fragment shader’s “in” variables can be used to receive values directly from both the vertex shader and the geometry shader.

4. Give a full acknowledgement of assistance. This includes anyone, any written source, any web site, etc., that helped you; and anyone you helped.