Problem 1: Compositing (15 pts)
Explain (in words and equations) what is meant by *premultiplied alpha*, and illustrate **two benefits** of using it.

Problem 2: Hidden surface elimination (15 pts)
What are **two pros** and **two cons** of the Z-Buffer algorithm for hidden surface elimination?

Problem 3: Ray intersection (15 pts)
What are **four ways** to accelerate ray-triangle intersection calculations when rendering large triangle meshes?

Problem 4: Distribution ray tracing (15 pts)
Propose a method for ray tracing a *glossy reflection*.

Problem 5: Beer’s Law (25 pts)
\(a\) Apply Beer’s law (twice) to provide an expression for the apparent color of a *white* horizontal emissive surface (i.e., a light) viewed through a horizontal layer of glass (of thickness \(h_{\text{glass}}\)) atop a horizontal layer of tinted water (of thickness \(h_{\text{water}}\)). Assume that the view ray is *perpendicular* to the horizontal surfaces, so that the total in-liquid path length is \((h_{\text{glass}} + h_{\text{water}})\).

\(b\) Does the apparent color depend on the particular *vertical order* of glass/water layers? Is this also true for non-normal incident view directions (i.e., \(\theta \neq 0\) in Snell’s law)?

Problem 6: Appearance modeling (15 pts)
What are **three** attractive features of procedural *Perlin noise* over image-based texture mapping?