1. The cross-dissolve method is a smooth transition, but doesn’t make it look like you are changing from one person to another. Suggest a way to make the transition look more like we are changing from one person to the other.

If two persons have the similar shape, it will look better.
If we could warp the object shape and appearance separately, it will look better.

2. The mesh in slide 8 is all quadrilaterals. It turns out to be easier to do this warp if the mesh is all triangles instead. Provide an algorithm to convert this quadrilateral mesh into a triangle mesh. Just describe it in English.

Split each quadrilateral into two triangles.

3. The ImageMorph application starts with two triangles and four vertices. Right-clicking adds a vertex. What are two ways you can add a vertex to a triangle mesh, making the new vertex a part of the mesh.

a) Click inside a triangle, changing it to three triangles.
b) Click on an edge, changing the two triangles adjacent to it into four.

4. Suppose I have a triangle with these vertices: (0, 0), (10, 0), (5, 5) and a Barycentric coordinate of (0.1, 0.8, 0.1). What is the corresponding point in the triangle?

\[
\begin{align*}
&\lambda_1 = \frac{(0 - 5)(5 - 5) - (10 - 5)(0 - 5)}{50} = \frac{-5(0) - (5)(-5)}{50} = 0.5
\end{align*}
\]

5. Suppose I have a triangle with these vertices: (0, 0), (10, 0), (5, 5) and the point (5, 0).

a) What is T?

\[
\begin{align*}
&\lambda_1 = \frac{(0 - 5)(5 - 5) - (10 - 5)(0 - 5)}{50} = \frac{-5(0) - (5)(-5)}{50} = 0.5
\end{align*}
\]

b) What is det(T)?

\[
\begin{align*}
&(-5 * -5) - (5 * -5) = 25 - (-25) = 50
\end{align*}
\]

c) What is l1?

\[
\begin{align*}
&\lambda_1 = \frac{(0 - 5)(5 - 5) - (10 - 5)(0 - 5)}{50} = \frac{-5(0) - (5)(-5)}{50} = 0.5
\end{align*}
\]
d) What is $l_2$?

$$\lambda_2 = \frac{-(0 - 5)(5 - 5) + (0 - 5)(0 - 5)}{50} = \frac{-(5)(-5) + (-5)(-5)}{50} = 0.5$$

e) What is $l_3$?

$$\lambda_3 = 1 - \lambda_1 - \lambda_2 = 0$$

Test: $0.5 (0, 0) + 0.5 (10, 0) + 0 (5, 5) = (5, 0)$ which is correct.

6. The triangle vertices in the source image are: $(0, 0), (20, 0), (5, 5)$ and the vertices in the destination image are: $(0, 0), (10, 0), (5, 5)$. Where will we get the color to draw for pixel $(5, 0)$ in the destination image.

Pixel $(5, 0)$ in the destination image is barycentric coordinate: $(0.5, 0.5, 0)$.
The equivalent point in the source image is: $0.5 (0, 0) + 0.5 (20, 0) + 0 (5, 5) = (10, 0)$