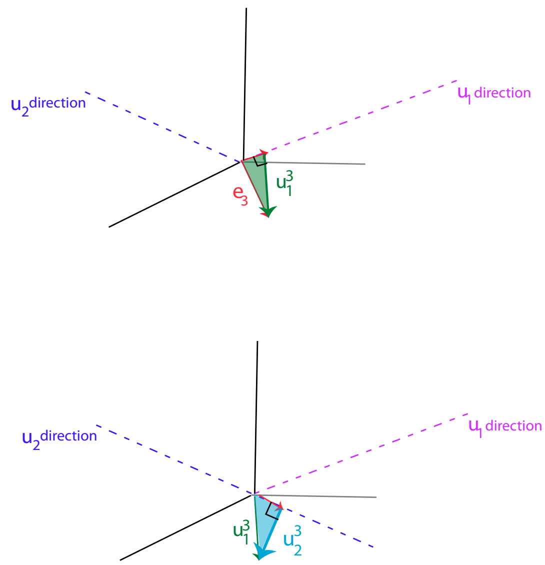

Figure 12.5: The top figure shows the construction of the blue u_1^3 as perpendicular to the orthogonal projection of e_3 onto u_1, while the bottom figure shows the construction of the sky blue u_2^3 as perpendicular to the orthogonal projection of u_1^3 onto u_2.

and observe that $u_2^3 = u_3'$. See Figure 12.5.

The following `Matlab` program implements the modified Gram–Schmidt procedure.

```
function q = gramschmidt4(e)
n = size(e,1);
for i = 1:n
    q(:,i) = e(:,i);
    for j = 1:i-1
        r = q(:,j)'*q(:,i);
        q(:,i) = q(:,i) - r*q(:,j);
    end
    r = sqrt(q(:,i)'*q(:,i));
    q(:,i) = q(:,i)/r;
end
end
```

If we apply the above function to the matrix

$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix},$$