Solution - Exercise [8]
Introduction to Computer Graphics - B-IT Master Course

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First Exercise

$S_{ABC} = \frac{1}{2}||(0,4) \times (2,-4)|| = 4$
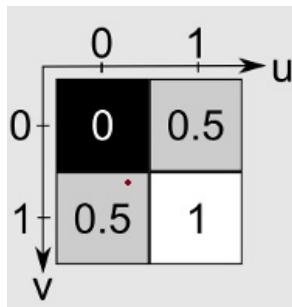
$S_{APB} = \frac{1}{2}||(0.5,-2) \times (0,-4)|| = 1$

$S_{APC} = \frac{1}{2}||(0.5,-2) \times (2,-4)|| = 1$

$S_{BPC} = \frac{1}{2}||(0.5,2) \times (2,0)|| = 2$

$P_{barycentric} = (\frac{1}{2}, \frac{1}{4}, \frac{1}{4})$

$P_{uv} = A_{bar} \cdot A_{uv} + B_{bar} \cdot B_{uv} + C_{bar} \cdot C_{uv} = \frac{1}{2}(0,0.5) + \frac{1}{4}(0.2,0.8) + \frac{1}{4}(0.6,0.7) = (0,0.25) + (0.05,0.2) + (0.15,0.175) = (0.2,0.625)$

Second Exercise

$UV = (0.2, 0.625)$
Color is gray

Third Exercise

$\alpha = x - i$
$\beta = y - j$
$U_{\alpha,j} = (1-\alpha)U_{i,j} + \alpha U_{i+1,j}$
$U_{\alpha,j+1} = (1-\alpha)U_{i,j+1} + \alpha U_{i+1,j+1}$

$I(x, y) = U_{\alpha\beta} = (1 - \beta)U_{\alpha,j} + \beta U_{\alpha,j+1}$
$i = 0, j = 0 \Rightarrow \alpha = x, \beta = y$
$U_{\alpha 0} = (1 - \alpha)U_{00} + \alpha U_{10}$
$U_{\alpha 1} = (1 - \alpha)U_{01} + \alpha U_{11}$
$I(x, y) = U_{\alpha\beta} = (1 - \beta)U_{\alpha,0} + \beta U_{\alpha,1}$
$\alpha = 0.2$
$\beta = 0.625$
$U_{\alpha 0} = 0.8 \cdot 0 + 0.2 \cdot 0.5 = 0.1$
$U_{\alpha 1} = 0.8 \cdot 0.5 + 0.2 \cdot 1 = 0.4 + 0.2 = 0.6$
$I(x, y) = U_{\alpha\beta} = (1 - 0.625) \cdot 0.1 + 0.625 \cdot 0.6 = 0.375 \cdot 0.1 + 0.375 = 0.4125$