Q5

Blue | Green | Red | Green
Blue | Green | Red | Green
Blue | Green | Red

Assign each cluster the label that appears most in that cluster.

Merge clusters with the same label.

Predicted

Confusion matrix

	Blue	Green	Red
Blue	4	3	1
Green	1	6	0
Red	2	4	5

Actual

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F_1\text{-}Score = \frac{2 \times Precision \times Recall}{Precision + Recall}$$

Cluster Blue:

$$Precision = \frac{4}{4+3} = \frac{4}{7}$$

$$Recall = \frac{4}{4+4} = \frac{1}{2}$$

$$F_1\text{-}score = 2 \times \frac{\frac{4}{7} \times \frac{1}{2}}{\frac{4}{7} + \frac{1}{2}} = \frac{8}{15}$$

Cluster Red:

$$Precision = \frac{5}{5+1} = \frac{5}{6}$$

$$Recall = \frac{5}{5+6} = \frac{5}{11}$$

$$F_1\text{-}score = 2 \times \frac{\frac{5}{6} \times \frac{5}{11}}{\frac{5}{6} + \frac{5}{11}} = \frac{10}{17}$$

Cluster Green:

$$Precision = \frac{6}{6+7} = \frac{6}{13}$$

$$Recall = \frac{6}{6+1} = \frac{6}{7}$$

$$F_1\text{-}score = 2 \times \frac{\frac{6}{13} \times \frac{6}{7}}{\frac{6}{13} + \frac{6}{7}} = \frac{3}{5}$$

Macro-averaged:

$$Precision = \frac{\frac{4}{7} + \frac{5}{6} + \frac{6}{13}}{3} \approx 0.6221$$

$$Recall = \frac{\frac{1}{2} + \frac{5}{11} + \frac{6}{7}}{3} \approx 0.6039$$

$$F_1\text{-}score = \frac{\frac{8}{15} + \frac{10}{17} + \frac{3}{5}}{3} \approx 0.5739$$