

1. A)

Classifier output	Gold Standard			
	Negative	Neutral	Positive	
	Negative	25	13	22
	Neutral	5	45	18
	Positive	7	10	35
		37	68	75
				180

B) Accuracy = $\frac{25 + 45 + 35}{180} = \frac{105}{180} = \frac{7}{12}$

C) Class positive
Precision = $\frac{TP}{TP + FP} = \frac{35}{52}$

Recall = $\frac{TP}{TP + FN} = \frac{35}{75} = \frac{7}{15}$

F-measure = $\frac{2PR}{P + R} = \frac{2 * (35/52) * (7/15)}{(35/52) + (7/15)} = \frac{(490/780)}{(525/780 + 364/780)}$
 $= \frac{(490/780)}{(889/780)} = \frac{382200}{693420} = \frac{70}{127}$

D)

	Negative	Not negative	
Negative	25	35	60
Not negative	12	108	120
	37	143	180

	Neutral	Not negative	
Neutral	45	23	68
Not negative	23	89	112
	68	112	180

	Positive	Not positive	
Positive	35	17	52
Not positive	40	88	128
	75	105	180

$$P_{\text{macro}} = ((25/60) + (45/68) + (35/52))/3 = 4645/2652$$

$$R_{\text{macro}} = ((25/37) + (45/68) + (35/75))/3 = 68087/37740$$

$$F_{\text{macro}} = (2 * (4645/2652) * (68087/37740)) / (4645/2652 + 68087/37740) = 316264115/177934512$$

E)

	Positive	Not positive	
Positive	105	75	180
Not positive	75	285	360
	180	360	540

$$P_{\text{micro}} = 105/180$$

$$R_{\text{micro}} = 105/180$$

$$F_{\text{micro}} = (2 * (105/180) * (105/180)) / ((105/180) + (105/180)) = 7/12$$