

AWS Certified Machine Learning - Specialty



Example Question

Confusion Matrix

5) A data scientist is evaluating different binary classification models. A false positive result is 5 times more expensive (from a business perspective) than a false negative result.

The models should be evaluated based on the following criteria:

- 1) Must have a recall rate of at least 80%**
- 2) Must have a false positive rate of 10% or less**
- 3) Must minimize business costs**

After creating each binary classification model, the data scientist generates the corresponding confusion matrix.

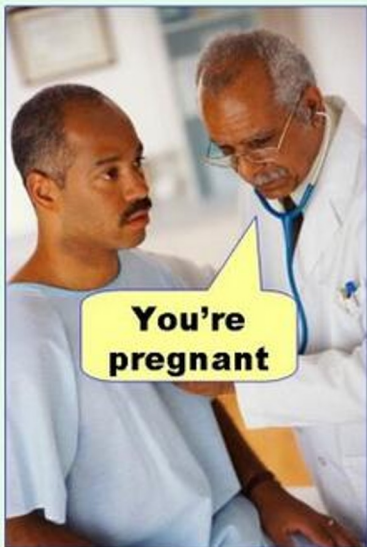
Which confusion matrix represents the model that satisfies the requirements?

- A) $TN = 91, FP = 9$
 $FN = 22, TP = 78$
- B) $TN = 99, FP = 1$
 $FN = 21, TP = 79$
- C) $TN = 96, FP = 4$
 $FN = 10, TP = 90$
- D) $TN = 98, FP = 2$
 $FN = 18, TP = 82$

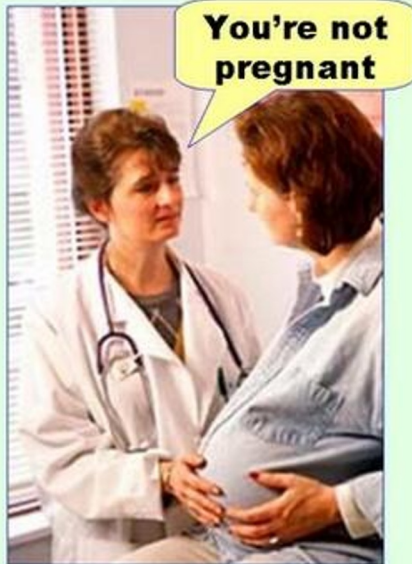
Evaluating Classification Models

Minimize Type I & II Error

Type I error
(false positive)



Type II error
(false negative)



		Predicted Value	
		Negative	Positive
Actual Value	Negative	True Negative	False Positive <small>Type I error</small>
	Positive	False Negative <small>Type II error</small>	True Positive

A)

	Pred NEG	Pred POS
True NEG	91	9
True POS	22	78

	Equation	Values	Solution
Recall	$TP / (TP + FN)$	$78 / (78 + 22)$	0.78
False Positive Rate	$FP / (TP + TN)$	$9 / (9 + 91)$	0.09
Costs	$5 * TP + FN$	$5 * 9 + 22$	67

B)

	Pred NEG	Pred POS
True NEG	99	1
True POS	21	79

	Equation	Values	Solution
Recall	$TP / (TP + FN)$	$79 / (79 + 21)$	0.79
False Positive Rate	$FP / (TP + TN)$	$1 / (1 + 99)$	0.01
Costs	$5 * TP + FN$	$55 * 1 + 21$	26

C)

	Pred NEG	Pred POS
True NEG	96	4
True POS	10	90

	Equation	Values	Solution
Recall	$TP / (TP + FN)$	$90 / (90 + 10)$	0.9
False Positive Rate	$FP / (TP + TN)$	$4 / (4 + 96)$	0.04
Costs	$5 * TP + FN$	$5 * 4 + 10$	30

D)

	Pred NEG	Pred POS
True NEG	98	2
True POS	18	82

	Equation	Values	Solution
Recall	$TP / (TP + FN)$	$82 / (82 + 18)$	0.82
False Positive Rate	$FP / (TP + TN)$	$2 / (2 + 98)$	0.02
Costs	$5 * TP + FN$	$5 * 2 + 18$	28

Final Comparison



	A	B	C	D
Recall	0.78	0.79	0.9	0.82
False Positive Rate	0.09	0.01	0.04	0.02
Costs	67	26	30	28