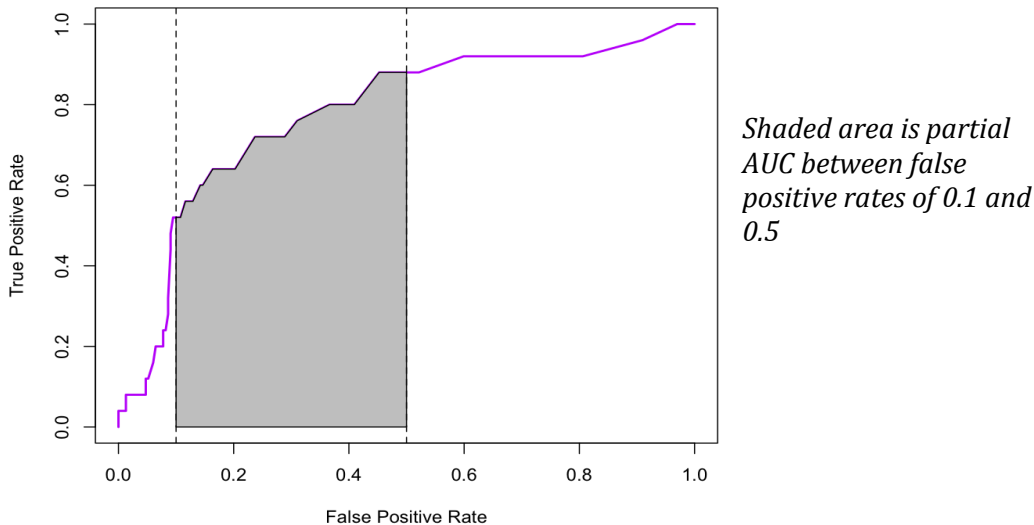


## Advanced R Programming for Bioinformatics

### Exercises for Session 4: Objects and Methods.

1. (a) Write a `summary()` method for the S3 ROC curve object that calculates the *partial area under the curve* (pAUC). That is, given an upper and lower endpoint for the false positive rate (x-axis), it computes the area under the curve between the upper and lower endpoints. The endpoints should default to 0 and 1, and the user should be able to specify both, just one, or neither.



(b) Repeat for the S4 ROC curve objects. For debugging, try using `trace()` with the `signature=` argument set to follow the S4 methods.

2. ROC curves are also useful for summarizing logistic regression models. Given a logistic regression model object `model` of class `glm`, we can extract the predicted values with `fitted(model)` and the observed binary outcome with `model$y` and then use the same computations to produce an ROC curve for the model.

(a) Write a function that computes the ROC curve for a logistic regression model.

(b) Write a *generic* function `ROC()` with methods that compute the ROC curve when the user supplies *either* a continuous test variable and binary outcome *or* a `glm` object.

3. Bioconductor packages come with vignettes describing how to do some specific tasks. Pick one of the following vignettes to work through. You may need to install additional Bioconductor packages – see the class site for commands to do this.

A: Sequence data;

```
vignette("GenomeSearching", package="BSgenome")
```

B: Flow cytometry data; (large, not very high-dimensional)

```
vignette("GettingStartedWithFlowStats", package="flowStats")
```

C: Gene expression data: Biobase package

```
vignette("Qviews")  
vignette("ExpressionSetIntroduction")
```