Patel's Dataset - PPV Lab

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```
prevalence = 1/20
sensitivity = 0.900
specificity = 0.926
population.size = 1659
```

```
expected.cases = population.size * prevalence
expected.cases
```

```
## [1] 82.95
```

```
expected.noncases = population.size - expected.cases
expected.noncases
```

```
## [1] 1576.05
```

```
expected.true.positives = expected.cases * sensitivity
expected.true.positives
```

```
## [1] 74.655
```

```
expected.false.positives = expected.noncases * (1 - specificity)
expected.false.positives
```

```
## [1] 116.6277
```

```
total.expected.positives = expected.true.positives + expected.false.positives
total.expected.positives
```

```
## [1] 191.2827
```

```
expected.false.negatives = expected.cases * (1 - sensitivity)
expected.false.negatives
```

```
## [1] 8.295
```

```r
expected.true.negatives = expected.noncases * specificity
expected.true.negatives
```

```
## [1] 1459.422
```

```r
total.expected.negatives = expected.true.negatives + expected.false.negatives
total.expected.negatives
```

```
## [1] 1467.717
```

```r
ppv = expected.true.positives / total.expected.positives
ppv
```

```
## [1] 0.3902862
```

```r
npv = expected.true.negatives / total.expected.negatives
npv
```

```
## [1] 0.9943484
```

```r
population.size = 1659
prevalence = 1/20
sensitivity = 0.900
specificity = 0.926

disease.status = vector("numeric", population.size)
test.result = vector("numeric", population.size)

disease.status = sample(c(0, 1), size = population.size,
                        prob = c(1 - prevalence, prevalence),
                        replace = TRUE)

for (k in 1:population.size) {

   if (disease.status[k] == 0) {
test.result[k] = sample(c(0, 1), size = 1, prob = c(specificity, 1 - specificity))

  }

  if (disease.status[k] == 1) {
test.result[k] = sample(c(0, 1), size = 1, prob = c(1 - sensitivity, sensitivity))

  }

}

result.table = table(test.result, disease.status)

addmargins(result.table)
```

```
##             disease.status
## test.result    0    1  Sum
##         0   1468   10 1478
##         1    108   73  181
##         Sum 1576   83 1659
```

```
ppv = sum(test.result[disease.status == 1] == 1) / sum(test.result == 1)
ppv
```

```
## [1] 0.4033149
```

```
npv = sum(test.result == 0 & disease.status == 0) / sum(test.result == 0)
npv
```

```
## [1] 0.9932341
```

```
prev = 1/20
sens = 0.980
spec = 0.926
numerator = prev * sens
denominator = prev * sens + (1 - spec) * (1 - prev)
ppv = numerator / denominator
ppv
```

```
## [1] 0.4107293
```

```
prev = 1/20
sens = 0.906
spec = 0.980
numerator = prev * sens
denominator = prev * sens + (1 - spec) * (1 - prev)
ppv = numerator / denominator
ppv
```

```
## [1] 0.7045101
```

```
prevalence = c(0.005, 0.015, 0.045, 0.090)
sensitivity = rep(0.90, 4)
specificity = rep(0.92, 4)

ppv.numerator = prevalence * sensitivity
ppv.denominator = ppv.numerator + (1 - prevalence) * (1 - specificity)
ppv = ppv.numerator / ppv.denominator
ppv
```

```
## [1] 0.05350773 0.14626219 0.34644996 0.52665800
```

```
npv.numerator = (1 - prevalence) * specificity
npv.denominator = npv.numerator + (prevalence) * (1 - sensitivity)
npv = npv.numerator / npv.denominator
npv
```

```
## [1] 0.9994541 0.9983475 0.9949043 0.9893642
```