Homework 9

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Exercise 22

```
a <- 5
b <- 3
c <- 2
d <- 10

P1 <- a / (a+b)
P0 <- c / (c+d)

cat(sprintf("p(ill | fish) = %.3f, p(ill | !fish) = %.3f", P1, P0))
```

```
## p(ill | fish) = 0.625, p(ill | !fish) = 0.167
```

Odds-ratio and confidence interval

Odds

```
odds_fish <- P1 / (1 - P1)
odds_nfish <- P0 / (1 - P0)

cat(sprintf(" odds(fish)  = %.3f, odds(!fish) = %.3f", odds_fish, odds_nfish))
```

```
##  odds(fish)  = 1.667, odds(!fish) = 0.200
```

Odds-ratio

```
OR <- odds_fish / odds_nfish
SE <- (1/a + 1/b + 1/c + 1/d) ^ (0.5)

cat(sprintf("OR(fish) = %.3f, 95%% confidence interval: [%.3f, %.3f]",
            OR, OR*exp(-qnorm(0.975) * SE), OR*exp(+qnorm(0.975) * SE)))
```

```
## OR(fish) = 8.333, 95% confidence interval: [1.034, 67.142]
```

Statistical test for odds-ratio

```
z <- log(OR)/SE

cat(sprintf("z = %.3f, significant difference from 1: %s", z, z > qnorm(0.975)))
```

```
## z = 1.992, significant difference from 1: TRUE
```

Risk-ratio and confidence interval

```
RR <- P1 / P0
SE <- ( ( b / (a*(a+b)) ) + ( d / (c*(c+d)) ) ) ^ (0.5)

cat(sprintf("RR(fish) = %.3f, 95%% confidence interval: [%.3f, %.3f]",
            RR, RR*exp(-qnorm(0.975) * SE), RR*exp(+qnorm(0.975) * SE)))
```

```
## RR(fish) = 3.750, 95% confidence interval: [0.949, 14.821]
```

Exercise 23

```
a <- 965
b <- 2691
c <- 957
d <- 2855

P1 <- a / (a+b)
P0 <- c / (c+d)

cat(sprintf("p(s | m) = %.3f, p(s | f) = %.3f", P1, P0))
```

```
## p(s | m) = 0.264, p(s | f) = 0.251
```

Odds ration

Odds

```
odds_m <- P1 / (1 - P1)
odds_f <- P0 / (1 - P0)

cat(sprintf(" odds(male)  = %.3f, odds(female) = %.3f", odds_m, odds_f))
```

```
##  odds(male)  = 0.359, odds(female) = 0.335
```

Odds-ratio

```
OR <- odds_m / odds_f
SE <- (1/a + 1/b + 1/c + 1/d) ^ (0.5)

cat(sprintf("OR(male) = %.3f, 95%% confidence interval: [%.3f, %.3f]",
            OR, OR*exp(-qnorm(0.975) * SE), OR*exp(+qnorm(0.975) * SE)))
```

```
## OR(male) = 1.070, 95% confidence interval: [0.964, 1.187]
```

Risk ratio

```
RR <- P1 / P0
SE <- ( ( b / (a*(a+b)) ) + ( d / (c*(c+d)) ) ) ^ (0.5)

cat(sprintf("RR(male) = %.3f, 95%% confidence interval: [%.3f, %.3f]",
            RR, RR*exp(-qnorm(0.975) * SE), RR*exp(+qnorm(0.975) * SE)))
```

```
## RR(male) = 1.051, 95% confidence interval: [0.973, 1.136]
```