Lösung: Intervallschätzung von μ, σ^2 bekannt

```
pulse.response <- na.omit(survey$Pulse)

n <- length(pulse.response)

sigma <- 11.69

sem <- sigma/sqrt(n)

ME <- qnorm(.995)*sem

xbar <- mean(pulse.response)

xbar + c(-ME,ME)


## [1] 71.97794 76.32415
```

Lösung: Intervallschätzung von μ, σ^2 bekannt

```
  library(TeachingDemos)
  z.test(pulse.response, sd=sigma, conf.level = 0.99)


##
##  One Sample z-test
##
## data:  pulse.response
## z = 87.893, n = 192.00000, Std. Dev. = 11.69000, Std.
## Dev. of the sample mean = 0.84365, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 99 percent confidence interval:
##  71.97794 76.32415
## sample estimates:
## mean of pulse.response
##               74.15104
```

Lösung: Intervallschätzung von μ, σ^2 unbekannt

```
pulse.response <- na.omit(survey$Pulse)
n <- length(pulse.response)
s <- sd(pulse.response)
SE <- s/sqrt(n)
E <- qt(.95, df=n-1)*SE
xbar <- mean(pulse.response)
xbar + c(-E,E)

## [1] 72.75693 75.54515
```

Lösung: Intervallschätzung von μ, σ^2 unbekannt

```
t.test(pulse.response, conf.level=0.9)


##
##  One Sample t-test
##
## data:  pulse.response
## t = 87.914, df = 191, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 90 percent confidence interval:
##  72.75693 75.54515
## sample estimates:
## mean of x
##  74.15104
```

Lösung: Stichprobengrösse bei μ

```
library(MASS)
pulse.response <- na.omit(survey$Pulse)
zstar <- qnorm(0.995)
s <- sd(pulse.response)
E <- 1
zstar^2*s^2/E^2

## [1] 906.2581
```

Lösung: Intervallschätzung von Populationsanteils p

```r
library(MASS)
smoke.response <- na.omit(survey$Smoke)
n <- length(smoke.response)
k <- sum(smoke.response == "Never")
pbar <- k/n
pbar

## [1] 0.8008475
```

Lösung: Intervallschätzung von Populationsanteils p

```
SE <- sqrt(pbar*(1-pbar)/n)
SE
```

```
## [1] 0.02599632
```

```
E <- qnorm(.95)*SE
E
```

```
## [1] 0.04276014
```

```
pbar + c(-E,E)
```

```
## [1] 0.7580873 0.8436076
```

Lösung: Intervallschätzung von Populationsanteils *p*

```
prop.test(k, n, conf.level=0.9)


##
##  1-sample proportions test with continuity correction
##
## data:  k out of n, null probability 0.5
## X-squared = 84.242, df = 1, p-value < 2.2e-16
## alternative hypothesis: true p is not equal to 0.5
## 90 percent confidence interval:
##  0.7525228 0.8420175
## sample estimates:
##         p
## 0.8008475
```

Lösung: Stichprobengrösse für p

```
zstar <- qnorm(0.995)
p <- 0.8
E <- 0.02
zstar^2 * p * (1-p) / E^2

## [1] 2653.959
```