HW #1

1.2, 1.6, 1.11, 1.12, 1.16, 1.18, 1.26, 1.27

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2.3

False

2.6

2.7

The p-value for the hypothesis that the mean difference is zero must be less than 0.05.

2.13

First I separated the dataset into fish oil and regular oil treatments:

```
fishoil <- ex0112 %>%
    filter(Diet == "FishOil")
regoil <- ex0112 %>%
    filter(Diet == "RegularOil")
```

Computing the sample averages and standard deviations:

```
oilcomp <- tibble(
    Diet = c("Fish Oil", "Regular Oil"),
    n = c(length(fishoil$BP), length(regoil$BP)),
    `Sample average` = c(mean(fishoil$BP), mean(regoil$BP)),
    `Sample stdev` = c(sd(fishoil$BP), sd(regoil$BP))
)

oilcomp %>%
    kbl(booktabs = TRUE, digits = 2, position = "h") %>%
    kable_styling()
```

Diet	n	Sample average	Sample stdev
Fish Oil	7	6.57	5.86
Regular Oil	7	-1.14	3.18

The pooled standard deviation is given by:

$$\sqrt{\frac{(7-1)*5.86+(7-1)*3.18}{7+7-2}},$$

which is equal to 4.71, and the pooled standard error of the difference in means is $4.71 * \sqrt{\frac{1}{7}+\frac{1}{7}}$, which equals 2.52. There are $7+7-2=12$ degrees of freedom associated with this estimate, and the 97.5th percentile of a *t*-distribution with 12 degrees of freedom is 2.18.

A 95% confidence interval is given by $\mu \pm t_{df}(0.975) \times SE$, which in this case gives 7.71 ± 5.4905589. The *t*-score is 3.06 and the one-sided *p*-value is 0.0049.

2.18

First I separated the data into 1976 and 1978 finches:

```
f6 <- ex0218 %>%
    filter(Year == 1976)
f8 <- ex0218 %>%
    filter(Year == 1978)
```

2.22