1. (b)

2. (c)

3. (ii)

4. (ii) and (iii)

5. (ii) and (iii)

6. (a) We can write the species counts for the "Logged" group on 9 separate slips of paper and place them in a bag. Similarly, we can write the species counts for the "Unlogged" group on 12 slips and place them in another bag. From the first bag, draw 9 slips with replacement, and calculate the mean $\bar{x}_L$. From the second bag, draw 12 slips with replacement, and calculate the mean $\bar{x}_U$. Subtract these two, $\bar{x}_L - \bar{x}_U$, to obtain a single bootstrap statistic.

   (b)
```r
-3.83 + c(-1,1) * 1.96 * 1.706
```
```
[1] -7.17376 -0.48624
```

   (c) $\mathbf{H}_0: \ \mu_L - \mu_U = 0$, vs. $\mathbf{H}_a: \ \mu_L - \mu_U \neq 0$.

   (d) If it were a randomization distribution, then values would be centered on the null value, 0. Instead, they are centered on (roughly) (-3.83), the value of $\bar{x}_L - \bar{x}_U$ obtained from the original sample.

   (e) We can reject the null hypothesis at the 5% level, as the null value (0) is outside the 95% CI.

7. (a) Since 131 is more than two standard deviations above the mean 100, it is outside the central 95% of observations in proximity to the mean. Said another way, it is past the 0.975-quantile, thus also beyond the 96$^{\text{th}}$ percentile.

   (b) The two standardized Z-scores:
$$\text{Jennifer: } \frac{156-122}{17} = 2.00, \qquad \text{Harry: } \frac{168-143}{13} = 1.923.$$
   Jennifer's performance is the one with the higher Z-score, giving her reason to be the most pleased of the two.

9. (a) Both populations are somewhat hypothetical. One is (all) children when praised for intelligence. The other is (all) children when praised for effort.

   (b) $\mathbf{H}_0: \ p_I - p_E = 0$ vs. $\mathbf{H}_a: \ p_I - p_E > 0$.
   What is assumed here is that we are looking at the proportions of those who *lie* in the two groups, not the proportions of those who tell the truth.

   (c) We first compute the pooled proportion:
$$\tilde{p} = \frac{15}{59},$$
   and using that along with sample sizes n_1, n_2, we get an estimated standard error
$$\text{SE}_{\widehat{p}_1 - \widehat{p}_2} = \sqrt{\frac{15}{59} \cdot \frac{44}{59} \cdot \left(\frac{1}{29} + \frac{1}{30}\right)} \doteq 0.1134,$$
   To standardize our test statistic:
$$z = \frac{11/29 - 4/30}{0.1134} \doteq 2.169.$$

(d)
```r
1 - pnorm(2.169)
```

10. (a) (ii)

(b)
```r
qt(0.97, df=15)
```

(c) *(5 pts)* Given the right critical value for 92% confidence in this scenario is 1.878, determine a 92% confidence interval using the centered interval approach.

```r
3.23 + c(-1,1)*1.878*.76/4

[1] 2.87318 3.58682
```

(d) What we have done is fairly standard practice. The one concern is that the procedure presumes the sampling distribution of the sample mean is normal. With the sample size of $n = 16$, we have not met the rule-of-thumb ($n \geq 30$) which confirms the reliability of this presumption.