Form B

1. (a) The description, "rejecting H_0 when it is true," is of a Type I error. The significance level α is $P(\text{rejecting } H_0 \mid H_0 \text{ is true})$. True

   (b) $n \geq 30$ provides assurance that the sampling distribution of $\bar{x}$ is approximately normal. The rule for $\hat{p}$ is np and $n(1-p)$ are at least 10. False

   (e) This would represent an SRS, not an iid sample. False

   (f) The P-value is the probability of seeing a result (the test statistic) at least as extreme as the one from our sample given H_0 is true. False

2. (a) (ii) is not a bootstrap sample only for the reason that the original sample size is 7, so all bootstrap samples must match this.

   (b) For (iii), $\bar{x} = \frac{1}{7}(28+51+28+44+72+68+34) \doteq 46.429$

3. (b) and (c) are true statements. (d) has things backwards in the sense that bootstrap distributions center around the (original) sample statistic. Randomization distributions are centered, if not on the population parameter, at least on the value of that parameter put forth in H_0.

4. The standardized scores are

$$\frac{78-85}{5.8} = -1.207 \qquad \text{and} \qquad \frac{81-87}{5.3} = -1.132$$

So 81, having the higher score (higher percentile) is the better performance.

5. (a) (iii) is the right interpretation. (ii) seems close, but represents Misrepresentation 3 as described on pp. 187-188.

   (b) If $\mu_1 = \mu_2$, then $\mu_1 - \mu_2 = 0$. But 0 is not inside the 92% CI. The flip side of constructing a CI at the 92% level is being open to rejecting H_0 at the 8% level. So, while it is possible that $\mu_1 = \mu_2$, we consider it implausible.

6. (a) We seek a 96% CI for p, and have point estimate $\hat{p} = 217/869 \doteq 0.250$. Since $n = 869$,

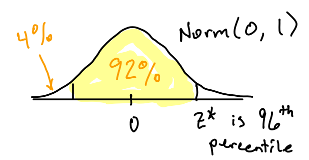
$$SE_{\hat{p}} = \sqrt{\frac{(0.25)(0.75)}{869}} \doteq 0.0147.$$

So, our bounds are

$$0.25 \pm (2.054)(0.0147),$$

giving the interval $(0.220, 0.280)$.

   (b) Confidence intervals for proportions use a critical value taken from Norm(0,1): gnorm(0.96)



7. Use formula

$$n \geq \left(\frac{z^*}{2M}\right)^2 = \left(\frac{1.96}{2(0.021)}\right)^2 \doteq 2177.8.$$

So, a sample size of at least 2178.

8. (a) $H_0: \mu = 7$ vs. $H_a: \mu \neq 7$

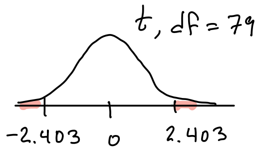
(b) n is in the denominator of the standard error formula $SE_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

The larger n is, the smaller the SE. $n = 150$

(c) The null hypothesis $(\mu_{pH} = 7)$ is false, but the evidence was not sufficiently convincing in the sample.

(d) We are concerned with means (not proportions) in this problem, and we do not have σ (as is typical). So our standardized test statistic is named t (not z).

$$t = \frac{7.18 - 7}{0.67/\sqrt{80}} \doteq 2.403.$$



There are df $= 80 - 1 = 79$ degrees of freedom, and our P-value corresponds to the shaded region: $2 * pt(-2.403, 79)$

(e) Since $0.021 > 0.01$, we fail to reject H_0. There is insufficient evidence that the mean pH level is not 7.