

1.
 - a. A four-day work week does not actually increase productivity, but we find convincing evidence that a four-day work week increases productivity.
 - b. Companies implement a four-day work week to increase productivity, but productivity does not actually increase as expected.
 - c. A four-day work week actually increases productivity, but we don't find convincing evidence that it increases productivity.
 - d. Companies don't implement a four-day work week since the study did not find convincing evidence that it would increase productivity, but they miss an opportunity since it would have actually increased productivity.

2.
 - a. H_0 : The pesticide has no effect on the survival rate of bees.
 H_a : The pesticide lowers the survival rate of bees.
 - b. Assuming the pesticide has no effect on the survival rate of bees, there is a 0.03 probability of getting the observed $\hat{p}_1 - \hat{p}_2$ or less purely by chance.
 - c. $0.03 < 0.05$, so the researchers reject H_0 and they do have convincing evidence that the pesticide lowers the survival rate of bees.
 - d. Type I error. A Type I error occurs when we reject H_0 when it is true, and the hypothesis test rejected H_0 .

3.
 - a. $H_0 : p = 0.04$, the new advertisement does not increase the CTR for this company's website.
 $H_a : p > 0.04$, the new advertisement increases the CTR for this company's website.
 - b. If the p -value is greater than $\alpha = 0.05$, the company would fail to reject the null hypothesis. There would not be convincing evidence that the new advertisement increases the CTR for the website.
 - c. The company would not use the new online advertisement.
 - d. Type II error. The company does not use the new advertisement, but it would have helped increase the CTR for the website. This is a missed opportunity to increase traffic and business.

4.
 - a. A Type I error is when the patient does not have the disease, but the diagnostic test determines that they have the disease.
A Type II error is when the patient has the disease, but the diagnostic test determines that they do not have the disease.
 - b. A Type II error would be worse because the patient has a serious disease, but does not get access to the rapid treatment intervention to improve the condition.
 - c. 0.01

5. a. Type I error: Sales stay the same after the price increases, but the corporation finds convincing evidence that sales decrease. The company would not increase the prices even though doing so would have increased profits.
Type II error: Sales decrease after the price increases, but the corporation doesn't don't find convincing evidence that sales decrease. The company would increase prices and sales would decrease.
- b. The corporation would be upset to miss the chance to increase profits, so a Type I error would be more serious for them.
- c. Customers would have to pay more for products unnecessarily, so a Type II error would be more serious for them.

6. D

7. C