

MAT 212 – Solutions to several hypothesis testing problems.

11.45 1) $H_0 : \mu = 5000$ $H_1 : \mu > 5000$

2) $z = \frac{\bar{x} - 5000}{400/\sqrt{n}}$

3) $z = \frac{5065 - 5000}{400/\sqrt{100}} = 1.62$

4) p-value = $P(Z > 1.62) = .5 - .4474 = .0526$

5) Since $0.0526 > 0.05$, we fail to reject H_0 .

6) There is weak evidence to conclude that the mean lifetime of these bulbs exceeds 5000 hours.

11.47 1) $H_0 : \mu = 560$ $H_1 : \mu > 560$

2) $z = \frac{\bar{x} - 560}{50/\sqrt{n}}$ 3) $z = \frac{569 - 560}{50/\sqrt{20}} = .81$

4) p-value = $P(Z > .81) = .5 - .2910 = .2090$

5) Since $0.2090 > 0.05$, we fail to reject H_0 .

6) There is no evidence to conclude that the mean GMAT score of MBA applicants is more than 560.

11.52 1) $H_0 : \mu = 20$ $H_1 : \mu < 20$

2) $z = \frac{\bar{x} - 20}{3/\sqrt{n}}$ 3) $z = \frac{19.39 - 20}{3/\sqrt{36}} = -1.22$

4) p-value = $P(Z < -1.22) = .5 - .3888 = .1112$

5) Since 0.1112 is not smaller than 0.05 , we fail to reject H_0 .

6) There is no evidence to infer that the number of customers will decrease.

11.53 1) $H_0 : \mu = 100$ $H_1 : \mu > 100$

2) $z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ 3) $z = \frac{105.7 - 100}{12/\sqrt{100}} = 4.75$

4) p-value = $P(Z > 4.75) < P(Z > 3.09) = .5 - .4990 = .0010$.

5) Decision: Reject the null hypothesis.

6) There is strong evidence to infer that the site is acceptable (more than 100 pedestrians pass by the location per hour).

11.56 1) $H_0 : \mu = 32$ $H_1 : \mu < 32$ (2) $z = \frac{\bar{x} - 32}{6/\sqrt{n}}$ (3) $z = \frac{29.92 - 32}{6/\sqrt{110}} = -3.64$

4) p-value = $P(Z < -3.64) < 0.0010$ (5) Reject the null hypothesis.

6) There is enough evidence to infer that the mean time away from desks is less than 32 minutes.

A type I error occurs when we conclude that the plan decreases the mean time away from desks when it actually does not. This error is quite expensive. Consequently we demand a low p-value (we set α low, which forces the p-value to be small in order to reject H_0).

The p-value is small enough to infer that there has been a decrease.