ANSWERS TO QUIZ 4

1. (a) $\hat{p} = \dfrac{257}{484}$

(b) 99% CI for p $= \hat{p} \pm 2.576\sqrt{\dfrac{\hat{p}\hat{q}}{n}}$ (**Note**: ok if used $z_{0.005} = 2.575$)

$= \dfrac{257}{484} \pm 2.576\sqrt{\dfrac{(\frac{257}{484})(\frac{227}{484})}{484}}$

$= 0.5310 \pm 0.0584$

$= (0.4726, 0.5894)$

(c) We are 99% sure that the population proportion of Ontario consumers who, if asked the survey question, would say they are optimistic about the economy falls between 0.4726 and 0.5894.

Minitab

Stat → Basic Statistics → 1 Proportion… → Summarized data
Number of trials: 484
Number of successes: 257

→ Options… → Confidence level: 99.0

→ Check: Use test and interval based on normal distribution → OK → OK

Test and CI for One Proportion

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Test of p = 0.5 vs p not = 0.5

Sample      X      N  Sample p          99.0% CI       Z-Value  P-Value
1         257    484  0.530992  (0.472563, 0.589421)     1.36    0.173
```

Ignore results for test.

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2. (a) $\sum x = 18.58$, $n = 15$

$\bar{x} = \dfrac{\sum x}{n} = \dfrac{18.58}{15} = 1.24$

(b) $\sum x^2 = 23.5368$

$s = \sqrt{\dfrac{\sum x^2 - \dfrac{\left(\sum x\right)^2}{n}}{n-1}} = \sqrt{\dfrac{23.5368 - \dfrac{18.58^2}{15}}{14}} = 0.193164$

(c) 99% CI for $\mu = \bar{x} \pm t_{.005} \dfrac{s}{\sqrt{n}}$

$= 1.24 \pm 2.977 \dfrac{0.193164}{\sqrt{15}}$

$= 1.24 \pm 0.15$

= (1.09, 1.39) millions of characters

(d) We are 99% confident that the mean number of characters printed before failure, for this particular type of printer, is somewhere between 1.09 and 1.39 millions of characters.

Minitab

Store data in C1 and name C1 '**characters**'.

Stat → Basic Statistics → 1-Sample t… → Variables: **characters** → Options… → Confidence level: 99.0 → OK → OK

One-Sample T: characters

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Variable          N      Mean     StDev   SE Mean         99.0% CI
characters       15    1.2387    0.1932    0.0499  (  1.0902,  1.3871)
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3. (a) H_0: The insurance analyst's suspicion is false.

   (b) H_0: $p \geq 0.40$

   (c) H_a: The insurance analyst's suspicion is true.

   (d) H_a: $p < 0.40$

4. (a) H_0: Bottles of ketchup are neither underfilled nor overfilled.

   (b) H_0: $\mu = 500$

   (c) H_a: Bottles of ketchup are either underfilled or overfilled.

   (d) H_a: $\mu \neq 500$