AP Stats Ch 20 - Required Practice   **Name:** _____**Per:** ____

#1. **Congenital abnormalities.** In the 1980s it was generally believed that congenital abnormalities affected about 5% of the nation's children. Some people believe that the increase in the number of chemicals in the environment has lead to an increase in the incidence of abnormalities. A recent study examined 384 children and found that 46 of them showed signs of an abnormality. Is this evidence that the risk has increased?

a) State the hypotheses:

b) Check conditions

c) Conduct the test (find the p-value). Do this by hand first, and then check your answer by using an appropriate hypothesis test in your calculator:

         <u>by hand</u>   <u>by calculator</u>

d) Write your conclusion paragraph.

#2. **DV Seniors (group investigation)**

a) In your group, each of you separately use your phones' internet browsers to browse to www.mrfelling.com/sa3 . Select 'One-sided, upper (>)' and click 'sample'.

b) Read the whole page on your phone, and record the following values that you got for your trial:

The hypotheses: H_0 :

H_A :

trial 1: null hypothesis p_0 = _____, your sample's $\hat{p}$ = _____, your p-value = _____

Now, click 'sample' twice to run two more trials, each with a different sample and record your results:

trial 2: null hypothesis p_0 = _____, your sample's $\hat{p}$ = _____, your p-value = _____

trial 3: null hypothesis p_0 = _____, your sample's $\hat{p}$ = _____, your p-value = _____

c) Compare with others in your group. Between trials, what stayed the same? What changed?

d) Why are your p-values different? Explain how a trial's $\hat{p}$ and p-value are related.

e) Click 'reset', select 'One-sided, lower (<)' and click 'sample' a few times. Compare what you see now to what your saw above for the upper case. Explain, in detail, what is different for a one-sided lower test compared to a one-sided upper test.

f) Click 'reset', select 'One-sided, lower (<)' and click 'sample' a few times. Compare what you see now to what your saw above. Explain, in detail, what is different for a two-sided test compared to a one-sided test.

#3. **Frogs** A certain species of poison-dart from always has a body with two yellow stripes on its back, but a percentage of frogs also have a blue stripe between the two yellow stripes. The blue stripe is historically found in 34% of the frogs. Industrial pollution has been found in rivers containing these frogs and researchers wonder if the pollution is causing a change in the percentage of frogs with the blue stripe. A random sample of 60 frogs was collected and 29 had the blue stripe. Does this data provide evidence that the proportion of frogs with the blue stripe has changed?

a) Conduct a hypothesis test (by hand) to answer the question (use p=0.34 when computing $\sigma_{\hat{p}}$):

b) Your analysis should have concluded that the percentage of frogs with the blue stripe has changed…but to what percentage? To establish a percentage for the population, now compute a 95% confidence interval around your statistic. (use $\hat{p}$ when computing $SE_{\hat{p}}$):

c) Is the null hypothesis value, 0.34, in your confidence interval?

2. **More hypotheses.** Write the null and alternative hypotheses you would use to test each of the following situations.

a) In the 1950s only about 40% of high school graduates went on to college. Has the percentage changed?

b) 20% of cars of a certain model have needed costly transmission work after being driven between 50,000 and 100,000 miles. The manufacturer hopes that redesign of a transmission component has solved this problem.

c) We field test a new flavor soft drink, planning to market it only if we are sure that over 60% of the people like the flavor.

6. **Cars.** A survey investigating whether the proportion of today's high school seniors who own their own cars is higher than it was a decade ago finds a P-value of 0.017. Is it reasonable to conclude that more high schoolers have cars? Explain.

19. Twins. In 2001 a national vital statistics report indicated that about 3% of all births produced twins. Is the rate of twin births the same among very young mothers? Data from a large city hospital found only 7 sets of twins were born to 469 teenage girls. Test an appropriate hypothesis and state your conclusion. Be sure the appropriate assumptions and conditions are satisfied before you proceed.

16. Satisfaction. A company hopes to improve customer satisfaction, setting as a goal no more than 5% negative comments. A random survey of 350 customers found only 10 with complaints.

a) Create a 95% confidence interval for the true level of dissatisfaction among customers.

b) Does this provide evidence that the company has reached its goal? Using your confidence interval, test an appropriate hypothesis and state your conclusion.

24. Jury. Census data for a certain county shows that 19% of the adult residents are Hispanic. Suppose 72 people are called for jury duty, and only 9 of them are Hispanic. Does this apparent underrepresentation of Hispanics call into question the fairness of the jury selection system? Explain.

Chapter 20 Practice Quiz

AP Statistics Quiz B – Chapter 20   *Name*_____

The International Olympic Committee states that the female participation in the 2004 Summer Olympic Games was 42%, even with new sports such as weight lifting, hammer throw, and modern pentathlon being added to the Games. Broadcasting and clothing companies want to change their advertising and marketing strategies if the female participation increases at the next games. An independent sports expert arranged for a random sample of pre-Olympic exhibitions. The sports expert reported that 202 of 454 athletes in the random sample were women. Is this strong evidence that the participation rate may increase?

1. Test an appropriate hypothesis and state your conclusion.

2. Was your test one-tail upper tail, lower tail, or two-tail? Explain why you choose that kind of test in this situation.

3. Explain what your *P*-value means in this context.