Your Name:

Duration of the Quiz is 25 minutes. There are three problems, worth 20 points. Show all your work for full credit. Books, notes etc. are prohibited.

(1) Let Y_1, Y_2, \ldots, Y_n denote a random sample from the probability density function

$$f(y; \theta) = (\theta + 1) y^{\theta}, \ 0 < y < 1, \ \theta > -1.$$

Compute the MLE for θ .

- (2) When a recent General Social Survey asked 1158 American adults, "Do you believe in Heaven?", the proportion who answered yes was 0.86. They would like to determine whether majority of the American adults believe in heaven.(a) State an appropriate null and alternative hypothesis.
 - (b) If they conduct a Wald Test using the χ^2 distribution to compute a *p*-value, find the observed value of the test statistic. You are only required to compute the value of the test statistic.
 - (c) If they conduct a Score Test using the χ^2 distribution to compute a *p*-value, find the observed value of the test statistic. You are only required to compute the value of the test statistic.

- (3) For a comparison of the rates of defectives produced by two assembly lines, independent random samples of 100 items were selected from each line. Line A yielded 18 defectives in the sample, and line B yielded 12 defectives. **Hint:** $z_{0.02} = 2.0537$, $z_{0.01} = 2.3263$
 - (a) Do the two assembly lines appear to differ with respect to proportion of defectives, at the 2% significance level?

(b) Find a 98% confidence interval for the true difference in proportions of defectives for the two lines.

(c) Is the value $p_1 - p_2 = 0$ inside or outside this interval?

(d) Based on the interval, should the null hypothesis be rejected? Why?

(e) How does the conclusion that you reached compare with your conclusion in part (a)?