STATISTICS APPLIED TO BUSINESS ADMINISTRATION
ACADEMIC YEAR 2019-2020
PRACTICAL EXERCISES 6 AND 7 (30 MINUTES)

Date: _____

Complete name:_____ ID number:_____

EXERCISE 1 (10 POINTS)

Let X be a r.v. with probability density function given by:

$$f(x,\theta) = \theta^2 \; x^{\theta^2-1}, \quad 0 < x < 1, \quad \theta > 0$$

Based on a r.s. of size $n = 1$, X_1, we wish to test the null hypothesis $H_0 : \theta = 1$ against the alternative hypothesis $H_1 : \theta = 2$.

1. **(3 points)** Find the most powerful critical region for this test and for the test statistic X_1. We can assume that $\alpha = 0.10$.
2. **(2 points)** Compute the power for this test.
3. **(5 points)** If we decide to reject the null hypothesis if $X_1 \in (0.80, 0.90)$, so that CR $= (0.80, 0.90)$, would this critical region and rejection rule define a more powerful test than the previous one for the stated significance level?

EXERCISE 2 (10 POINTS)

We wish to investigate if there exists a gender effect on the preferences individuals have with respect to the specific television programs they watch. In order to do so, a random sample of 1000 individuals has been taken and individuals were asked about which one of the following types of TV program they prefer to watch: sports, contests or movies. Individuals were then classified according to their gender and their TV program preference, resulting in the following table:

Gender	**Sports**	**Contests**	**Movies**	**Totals**
Male	210	140	130	480
Female	150	160	210	520
Totals	360	300	340	1000

1. **(7 points)** At the 5% significance level, what is the test resulting decision?
2. **(3 points)** If we first center on the row corresponding to the male participants and estimate the proportion of males watching sports TV programs, and then focus on the row corresponding to the female participants and also estimate the proportion of females watching sports TV programs, at the 10% significance level, test the null hypothesis that the proportion of males watching sports TV programs is equal to that of females, against the alternative hypothesis that it is larger.