Pledge:

I. A study of first year computer science students at a large university was conducted in order to try to predict cumulative grade point average (GPA) after three semesters. Among the explanatory variables recorded when students entered the university were their average high school grades in mathematics (HSM), science (HSS), and English (HSE). The high school grades are coded on a scale from 1 to 10 with 10 corresponding to an A, 9 to an A-, 8 to a B+, 7 to B, 6 to B- etc.   Below is the regression analysis for a random sample of 224 first year computer science students at this university. Let β_{HSM}, β_{HSS}, and β_{HSE} be the true population coefficients for HSM, HSS, and HSE, respectively. Please answer the following:
(11 points total)

R^2 0.205	F 18.86
n 224	p-value 6.36E-11
k 3	

Dep. Var. **gpa**

(a) For the hypothesis given below, state the value of the test statistic, the p-value of the test, and the conclusion of the test. (4 points)

$H_0 : \beta_{HSM} = \beta_{HSS} = \beta_{HSE} = 0$
$H_1 : At\ least\ one\ is\ population$
$coefficient\ is\ different\ from\ zero$

Regression output

variables	coefficients	std. error	t (df=220)	p-value
Intercept	0.5899	0.2942	2.005	.0462
HSM	0.1686	0.0355	4.749	3.68E-06
HSS	0.0343	0.0376	0.914	.3619
HSE	0.0451	0.0387	1.166	.2451

(b) What percent of the variation in GPA is explained via this regression model by the variables HSM, HSS, and HSE? (1 point)

(c)   For the hypotheses $H_0 : \beta_{HSS} = 0$ and $H_1 : \beta_{HSS} \neq 0$, what is the value of the test statistic, the p-value of the test, and your conclusion in terms of the coefficient for HSS. (4 points)

(d) What is the regression equation? Use this equation to predict the expected GPA for first year computer science majors who have an A- in HSM, a B+ in HSS, and a B in HSE.   (2 points)

II. Market researchers know that background music can influence the mood and purchasing behavior of customers. One study in a supermarket in Northern Ireland compared three treatments: no music, French accordion music, and Italian string music. Under each condition, the researchers recorded the numbers of bottles of French, Italian, and other wine purchased. The table below summarizes the data. Please answer the following questions: (9 points total)

(a) How many bottles of Italian wine were bought when there was no background music playing? (1 point)

(b) *If there is no influence of type of background music playing on type of wine purchased* (i.e. no relationship between music type and type of wine), then for the 243 bottles of wine purchased, how many *would you expect* to be Italian wines purchased when no background music was playing? (2 points)

Wine	Music			
	None	French	Italian	**Total**
French	30	39	30	99
Italian	11	1	19	31
Other	43	35	35	113
Total	84	75	84	243

(c) Conduct the appropriate hypothesis test to determine if there is a relationship between type of background music playing and type of wine purchased. Clearly what test you are conducting, your null and alternative hypotheses, the value of your test statistic, the *p*-value of the test, and your conclusion in the context of this problem. (6 points)