Math 263: Review for Exam 3

1. Samples of students in two schools have SAT scores given in the table below:

School 1	Sample of 43 students	Mean 502	Standard deviation 60
School 2	Sample of 35 students	Mean 480	Standard deviation 50

   (a) Is there are significant difference between the mean the SAT scores in the two schools?

   (b) Interpret the p-value

   (c) Find a 95% confidence interval for the difference in mean scores between the schools.

   (d) How do the answers to parts (a) and (c) relate to each other?

2. (a) The average blood sugar reading in the population is 5.31 mmol/L with standard deviation 0.58 mmol/L. A person has 60 blood sugar readings averaging 5.15 mmol/L. Is there evidence that the person's blood sugar reading is abnormal at the 5% significance level? At the 1% level?

   (b) What is the lowest significance level at which the statistic in part (a) is significant?

   (c) What difference does it make in part (a) if the standard deviation 0.58 is found from the sample?

3. The American Obesity Association (AOA) reports that 9% of parents think their children are overweight, and that 15% actually are overweight. In a sample of 750 parents, 68 say their children are overweight.

   (a) Using only the sample, find the 95% confidence interval for the percentage of parents in the population that think their children are overweight.

   (b) What is the interpretation of the interval?

   (c) Is the proportion in the sample thinking their children are overweight different than that reported by the AOA? Do this using a hypothesis test. Confirm by referring to the confidence interval.

   (d) Is the proportion in the sample thinking their children are overweight different than the proportion of children in the population who are actually overweight? Do this using a hypothesis test. Confirm by referring to the confidence interval.

4. A geologist collects hand-specimen sized pieces of limestone from a particular area. A qualitative assessment of both texture and color is made with the following results.

	Colour		
Texture	Light	Medium	Dark
Fine	4	20	8
Medium	5	23	12
Coarse	21	23	4

   At the 1% level, test whether there is evidence of association between color and texture for these limestones? Use the following steps:
   (a) State the null and alternative hypotheses.

(b) Fill in the 4 missing entries in the following table of expected values.

	Colour			
Texture	Light	Medium	Dark	
Fine	8	17.6	6.4	32
Medium	10			40
Coarse	12			48
	30	66	24	120

(c) Write down an expression (involving numbers) for the test statistic. You do not need to evaluate it.

(d) Given that the value of the statistic is $\chi^2 = 17.727$, what can you say about the *P*-value?

(e) What is your conclusion about the limestones?

5. On September 9, 2008, a CNN poll of 1022 people reported 57% of men and 45% of women thought Sarah Palin was qualified to be president. The poll also reported whether respondents thought such questions were fair.[1] Assume the data in the following table:

	Men saying "yes"	Women saying "yes"
Is Palin qualified to be president?	291	230
Are such questions fair?	248	261
Number in sample	510	512

(a) Is there a significant difference in the proportion of men and of women who believed Palin qualified to be president?

(b) Is there a significant difference in the proportion of men and of women who thought such questions were fair?

(c) Overall, 57% of the respondents had a favorable opinion of Palin. What was the margin of error?

(d) What sample size would have a made the margin of error in part (c) equal to 2%?

[1] http://www.cnn.com/2008/POLITICS/09/09/palin.poll/index.html; some numbers added.