STAT220: WINTER 2006: QUIZ 3: March 2

Student name	Section

Please fill in your name and section. Answer both the questions, on the question paper.
If you need more space, write on the back of THIS page.
It should take at most 20 minutes to complete this quiz.
Another page with a normal table, and some useful formulas is available: please keep it.

Show your work
The US military have extensive records, and therefore it is possible to take a simple random sample either of **US military veterans**, or of **current US military personnel**. Each is a large population.

By mistake: the points on this quiz add up to 11! This quiz does score equally with the other quizzes. That is, I will adjust scores before taking best two quiz scores.

Suppose that among the large population of **US military veterans**, there are 55% white, 20% African Americans, and 25% of others (Hispanic, Asian Americans, Native Americans etc.).

1. A simple random sample of 1600 is taken from the population of US military veterans

(i) (2 points) What are the expected value (EV) and standard error (SE) of the number of African Americans in the sample?

$$\textbf{EV} = \textbf{1600} \times \textbf{0.2} = \textbf{320}, \qquad \textbf{SE} = \sqrt{1600} \times \sqrt{0.2 \times 0.8} = \textbf{40*0.4} = \textbf{16}$$

(ii) (2 points) What is the chance that there are more than 348 African Americans in the sample?

z-score = (348 -320)/16 = 1.75.   From table, between-area=92%.
So required chance is (100-92)/2 = 4%.

2. Another simple random sample of 1600 is taken from the same population of US military veterans.

(i) (1.5 points) What are the expected value (EV) and standard error (SE) of the proportion of African Americans in the sample?

EV = population proportion = 20%.
$$\textbf{SE} = \sqrt{.2 \times 0.8}/\sqrt{1600} = \textbf{0.4/40} = \textbf{0.01 or 1\%}$$

(ii) (2 points) What is the chance that the proportion of African Americans in the sample is less than 19%?

z-score = (19 -20)/1 = -1.   From table, between-area = 68%.
So required chance is (100-68)/2 = 16%.

3. Now a simple random sample of 1600 is taken from the large population of **current US military personnel**. In the sample, there are 25% African Americans, so we estimate there are 25% African Americans among **current US military personnel**.

(i) (2 points) How should we estimate the standard error (SE) of this estimated proportion of African Americans among **current US military personnel**?

Use the sample proportion in the formula for SD of box.
(Method: one point, whether implicit or explicit)
$$\textbf{Estimated SE} = \sqrt{0.25 \times 0.75}/\sqrt{1600} = \textbf{0.433/40} = \textbf{1.1\%}.\quad \text{(2 nd point)}$$
(Note, actual estimate might be done either under (i) or (ii) – either way correct answer gets 1 point.
Rounding to 1% is ok, but need to see they are rounding the correct thing.)

(ii) (1.5 points) What is the 95% confidence interval for the proportion of African Americans among **current US military personnel**?

(Observed proportion ± 2 estimated-SE), or 22.8% to 27.2%.
(Note: The 1.5 points are for getting the Conf.Intv, after computing the estimated SE.
Method is 1 point. Answer is 0.5 points. Rounding OK.)