Problem 1

(a) $P(\text{death penalty} \mid \text{defendant white}) = \frac{53}{467} = 11.35\%$

$P(\text{death penalty} \mid \text{defendant black}) = \frac{11}{48} = 22.92\%$

A black defendant was more likely to receive death penalty.

(b) $P(\text{death penalty} \mid \text{defendant white}) = \frac{0}{16} = 0$

$P(\text{death penalty} \mid \text{defendant black}) = \frac{4}{143} = 2.8\%$

A black defendant was more likely to receive death penalty.

(c)

Defendant's Race	Death Penalty		Total
	Yes	No	
White	53	430	483
Black	15	176	191

Ignoring the information about victim's race

$P(\text{death penalty} \mid \text{defendant white}) = \frac{53}{483} = 10.97\%$

$P(\text{death penalty} \mid \text{defendant black}) = \frac{15}{191} = 7.85\%$

A white defendant was more likely to receive death penalty.

(d) When the defendant was white, the victim was more likely to be white. When the defendant was black, the victim was more likely to be black.

The cases about white victims have a majority impact on death penalty to white defendants, and the death penalty was more likely to be given when the victim was white.

Problem 2

(a) Multistage sampling

(b) Voluntary Response Sampling

(c) Stratified Sampling

Problem 3

This estimate is likely to be too high. The survey kept selecting the households where people are at home, and those smaller households may have longer time absent from home but they are ignored by the survey.

Problem 4

I am not convinced. The voters who oppose the bill may have stronger motivation to write a letter, and those who agree with the bill are less likely to respond. This can cause a sampling bias.

Problem 5

(a) Treatment: Whether praising the effort or intelligence of a group. Response variable: Choice of a challenging task or a easy task

(b) We can not make such a conclusion without considering other factors like sampling size and sampling strategy.

(c) The subjects were not sampled from some population at large. The results can not be generalized to the population at large, because the students are all from Stanford which are not representative and may cause sampling bias.