Stat 134: Section 25

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Problem 1

Here is a summary of Pre-SAT and SAT scores of a large group of students.

PSAT scores:	average: 1200	SD: 100
SAT scores:	average: 1300	SD: 90
correlation: 0.6		

a. Of the students who scored 1000 on the PSAT, about what percentage scored above average on the SAT?

b. Of the students who scored below average on the PSAT, about what percentage scored above average on the SAT?

c. About what percentage of students got at least 50 points more on the SAT than on the PSAT?

Ex 6.5.1 in Pitman's Probability

Problem 2

Data from a large population indicate that the heights of mothers and daughters in this population follow the bivariate normal distribution with correlation 0.5. Both variables have mean 5 feet 4 inches, and standard deviation 2 inches. Among the daughters of above average height, what percent were shorter than their mothers?

Ex 6.5.2 in Pitman's Probability

Problem 3

Suppose X and Y are standard normal variables. Find an expression for $P(X + 2Y \leq 3)$ in terms of the standard normal distribution function Φ,

a. in case X and Y are independent;

b. in case X and Y have bivariate normal distribution with correlation $1/2$.

Ex 6.5.4 in Pitman's Probability

Problem 4

Let X and Y be independent standard normal variables.

a. For a constant k, find $P(X > kY)$.

b. If $U = \sqrt{3}X + Y$, and $V = X - \sqrt{3}Y$, find $P(U > kV)$.

c. Find $P(U^2 + V^2 < 1)$.

d. Find the conditional distribution of X given $V = v$.

Ex 6.5.6 in Pitman's Probability