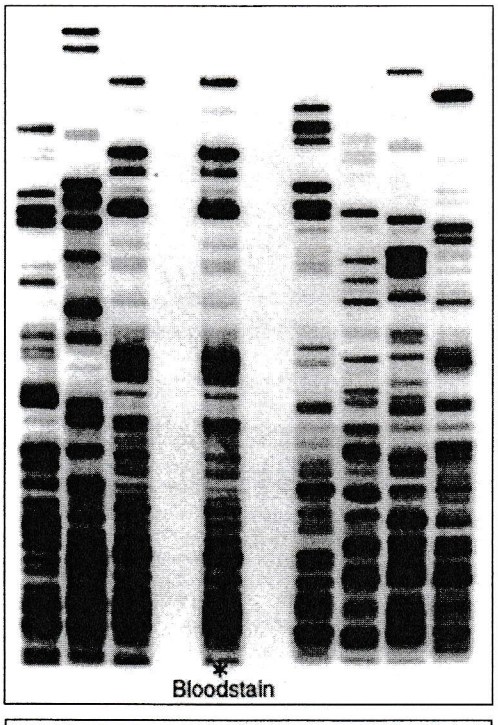
DNA FINGERPRINTING PRACTICE PROBLEMS

(adapted from The Biology Project, www.biology.arizona.edu)



The gel above is from a real case in which DNA fingerprinting was used to compare evidence from a crime scene with multiple suspects' DNA

"The Federal Bureau of Investigation (FBI) and most state law enforcement agencies use...13 different regions of the human genome to produce a near-unique DNA profile of an individual...The probability that two people will have the same DNA profile by sheer accident is between one in 100,000 and one in a billion." (Singh-Cundy and Cain, *Discover Biology*, 5th ed.) For a full profile match in a criminal case, all 13 bands used by the FBI are the same in the DNA samples from the crime scene and the suspect; in reality, most DNA profiles are partial. The following questions are based on partial profiles.

1. As part of the investigation surrounding a rape, lab technicians loaded DNA samples from multiple sources into the gel: a blood sample from the victim, a blood sample from the defendant, DNA size markers, the female fraction from a vaginal swab of the victim, and the male fraction from a vaginal swab of the victim. If you are the DNA analyst, you should conclude that:

a) The defendant is guilty.
b) The vaginal swab is from the wrong victim.
c) The defendant is excluded as a source of the DNA evidence.
d) The defendant might be guilty, but more bands are needed.

Explain your answer.