**1.** *If $A$ is the event that an astronaut is a member of the armed services, $T$ is the event that he or she was once a test pilot, and $S$ is the event that he or she is a scientist, express each of the following probabilities symbolically:*

*(i) the probability that an astronaut who was once a test pilot is a member of the armed services*

*(ii) the probability that an astronaut who is a member of the armed services is a scientist but was never a test pilot*

*(iii) the probability that an astronaut who is not a scientist was once a test pilot*

*(iv) the probability that an astronaut who is a member of the armed services but was never a pilot is a scientist*

*Solution.* (i) $P(A \mid T)$

(ii) $P(S \setminus T \mid A)$

(iii) $P(T \mid S^{\complement})$

(iv) $P(S \mid A \setminus T)$

□

**2.** *There are 60 qualified applicants for teaching positions in a high school, of which some have had at least five years' teaching experience and some have not, some are married and some are single, with the exact breakdown being*

| | *Married* | *Single* |
|---|---|---|
| *At least five years teaching experience* | *12* | *6* |
| *Less than five years teaching experience* | *24* | *18* |

*If the order in which the applicants are interviewed by the principal is random, $M$ is the event that the first applicant interviewed is married, and $F$ is the event that the first applicant interviewed will have had at least five years' teaching experience, determine the following probabilities from the table:*

*(i)* $P(M)$

*(ii)* $P(M^{\complement})$

*(iii)* $P(F)$

*(iv)* $P(F^{\complement})$

*(v)* $P(MF)$

*(vi)* $P(M \mid F)$

*(vii)* $P(F \mid M)$

*(viii)* $P(M^{\complement} \mid F^{\complement})$

*(ix)* $P(F^{\complement} \mid M^{\complement})$

*(x)* $P(M^{\complement}F^{\complement})$

*Solution.* (i) $P(M) = 36/60 = 3/5$

(ii) $P(M^{\complement}) = 2/5$

(iii) $P(F) = 18/60 = 3/10$

(iv) $P(F^{\complement}) = 7/10$

(v) $P(MF) = 12/60 = 1/5$

(vi) $P(M \mid F) = 12/18 = 2/3$