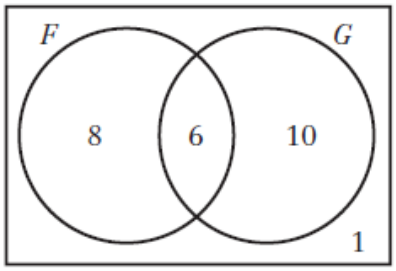
Probability 5B

1 a



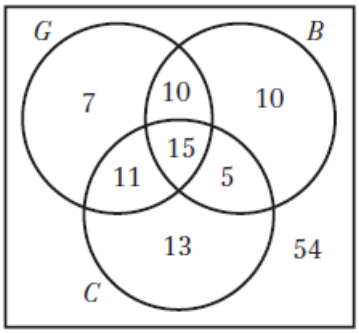
b i $P(F) = \frac{14}{25}$

ii $P(F \cap G) = \frac{6}{25}$

iii $P(\text{French but not German}) = \frac{8}{25}$

iv $P(\text{Neither French nor German}) = \frac{1}{25}$

2 a



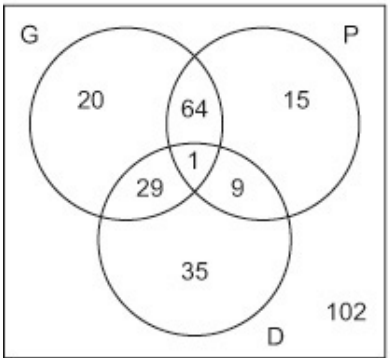
b i $P(\text{All three}) = \frac{15}{125} = \frac{3}{25}$

ii $P(\text{Beer but not cheesecake and not garlic bread}) = \frac{10}{125} = \frac{2}{25}$

iii $P(\text{Garlic bread and beer but not cheesecake}) = \frac{10}{125} = \frac{2}{25}$

iv $P(\text{None}) = \frac{54}{125}$

3 a



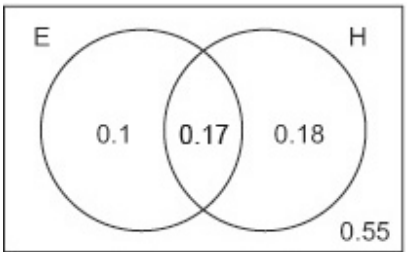
b i $\mathrm{P}(\text{Plays piano}) = \dfrac{89}{275}$

ii $\mathrm{P}(\text{At least 2}) = \dfrac{64+9+29+1}{275} = \dfrac{103}{275}$

iii $\mathrm{P}(\text{Plays exactly one}) = \dfrac{20+15+35}{275} = \dfrac{14}{55}$

iv $\mathrm{P}(\text{Plays none}) = \dfrac{102}{275}$

4

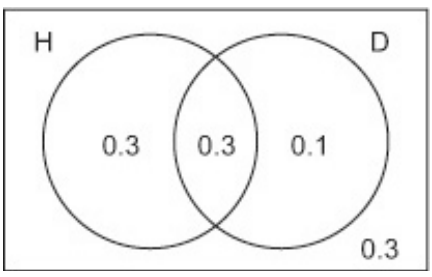


a $\mathrm{P}(E \cap H) = \mathrm{P}(E) + \mathrm{P}(H) - \mathrm{P}(E \cup H)$
$= 0.27 + 0.35 - 0.45$
$= 0.17$

b $\mathrm{P}(\text{Blonde hair but not Blue eyes}) = 0.35 - 0.17 = 0.18$

c $\mathrm{P}(\text{Neither}) = 1 - \mathrm{P}(E \cup H) = 1 - 0.45 = 0.55$

5



5 a $P(H \cap D) = P(H) + P(D) - P(H \cup D)$
$= 0.6 + 0.4 - 0.7$
$= 0.3$

b P(Hiya only) $= 0.6 - 0.3 = 0.3$

6 a P(B) = x + 0.1 + 0.2 = 0.45

So $x = 0.45 - 0.3 = 0.15$.

b $y = 1 - (0.35 + 0.15 + 0.1 + 0.2 + 0.05) = 1 - 0.85 = 0.15$

7 P(M) = 0.32 + p

P(P) = p + q + 0.07

As P(M) = P(P), 0.32 + p = p + q + 0.07.

So, rearranging, $q = 0.32 - 0.07 = 0.25$.

$p = 1 - (0.32 + 0.25 + 0.07 + 0.13 + 0.1) = 0.13$

$p = 0.13$, $q = 0.25$

Challenge

P(B) = p + q + 0.05

P(A) = 0.15 + p

As P(B) = 2P(A), $p + q + 0.05 = 2(0.15 + p)$, or $p + q + 0.05 = 0.3 + 2p$

So our first equation relating p and q is: $q = 0.25 + p$

As P(not C) = 0.83

$0.15 + p + q + 0.2 = 0.83$, so our second equation results: $p + q = 0.48$

Using substitution to solve simultaneously:

$p + (0.25 + p) = 0.48$, so $2p = 0.23$ and therefore $p = 0.115$

$q = 0.25 + 0.115 = 0.365$

P(C) = 1 – P(not C) = 1 − 0.83 = 0.17

Hence $r + 0.05 = 0.17$, so $r = 0.12$

$p = 0.115$, $q = 0.365$, $r = 0.12$