The posterior probability distributions for each of the four possible samples.

sample	$(1,1)$	$(1,2)$
$\theta = 1$	$(1/4)\,(1/5)/m(1,1)$	$(1/4)\,(1/5)/m(1,2)$
$\theta = 2$	$(1/9)\,(2/5)/m(1,1)$	$(2/9)\,(2/5)/m(1,2)$
$\theta = 3$	$(9/16)\,(2/5)/m(1,1)$	$(3/16)\,(2/5)/m(1,2)$
sample	$(2,1)$	$(2,2)$
$\theta = 1$	$(1/4)\,(1/5)/m(2,1)$	$(1/4)\,(1/5)/m(2,2)$
$\theta = 2$	$(2/9)\,(2/5)/m(2,1)$	$(4/9)\,(2/5)/m(2,2)$
$\theta = 3$	$(3/16)\,(2/5)/m(2,1)$	$(1/16)\,(2/5)/m(2,2)$

$$m(1,1) = 1/20 + 2/45 + 18/80 = 23/72$$
$$m(1,2) = 1/20 + 4/45 + 6/80 = 77/360$$
$$m(2,1) = m(1,2)$$
$$m(2,2) = 1/20 + 8/45 + 2/80 = 91/360$$

sample	$(1,1)$	$(1,2)$
$\theta = 1$	$18/115$	$18/77$
$\theta = 2$	$16/115$	$32/77$
$\theta = 3$	$81/115$	$27/77$
sample	$(2,1)$	$(2,2)$
$\theta = 1$	$18/77$	$18/91$
$\theta = 2$	$32/77$	$64/91$
$\theta = 3$	$27/77$	$9/91$