42)

a) New 1:

$$p(B \wedge C) = 2/3\left(\tfrac{1}{2}\right) + 1/3\,(0) = 1/3$$
$$p(B \wedge \neg C) = 2/3\,(1/2) + 1/3\,(0) = 1/3$$
$$p(\neg B \wedge C) = 2/3\,(0) + 1/3\,(1/2) = 1/6$$
$$p(\neg B \wedge \neg C) = 2/3\,(0) + 1/3\,(1/2) = 1/6$$

New 2:

$$p(B \wedge C) = 3/4\,(2/3) + 1/4\,(0) = 1/2$$
$$p(B \wedge \neg C) = 3/4\,(0) + 1/4\,(2/3) = 1/6$$
$$p(\neg B \wedge C) = 3/4\,(1/3) + 1/4\,(0) = 1/4$$
$$p(\neg B \wedge \neg C) = 3/4\,(0) + 1/4\,(1/3) = 1/12$$

b) Credence in B doesn't change between t_1 + t_2 – stays at $2/3$. Credence in C doesn't change between t_0 and t_1 – stays at $1/2$.

c) B and C are probabilistically independent in the priors at t_0 (and again in the distribution at t_1, prior to the second update).

d) BF for the $C:\neg C$ update above was 3. Using that BF on the distribution at t_0:

$$p(B \wedge C) = 3/4\,(1/2) + 1/4\,(0) = 3/8$$
$$p(B \wedge \neg C) = 3/4\,(0) + 1/4\,(1/2) = 1/8$$
$$p(\neg B \wedge C) = 3/4\,(1/2) + 1/4\,(0) = 3/8$$
$$p(\neg B \wedge \neg C) = 3/4\,(0) + 1/4\,(1/2) = 1/8$$

e) Doing the update on the $C:\neg C$ partition first will result in the same posterior for C as when the updates happened in the other order. This isn't true in general, but holds here because of the probabilistic independence of pairs of cells from each upd

43)

a) EV(not fouling) =

p(3-pt attempt | not fouling) p(3-pt success | 3-pt attempt) (pts if successful)

$= (1)(.443)(3) = 1.329$

b) EV(fouling) =

p(3-pt attempt | fouling) p(3-pt success | 3-pt attempt) (pts if successful)

+ p(1st FT attempt | fouling) p(1st FT success | 1st FT attempt) (pts if successful)

+ p(2nd FT attempt | fouling) p(2nd FT success | 2nd FT attempt) (pts if successful)

+ p(3rd FT attempt | fouling) p(3rd FT success | 3rd FT attempt) (pts if successful)

$= (0)(.443)(3) + (1)(.914)(1) + (1)(.914)(1) + (1)(.914)(1)$

$= 2.742$

c) $2.742 > 1.329$, so don't foul him

4u).

a) $p(P)\cdot x + p(\neg P)\cdot y = p(P)\cdot y + p(\neg P)\cdot x$

$p(P)(x-y) = p(\neg P)(x-y)$

$p(P) = p(\neg P)$ since $x \neq y$

If we assume the agent is probabilistic, $p(P) = 1/2$

b) $p(Q)\cdot d + p(\neg Q)\cdot -d = p(Q)\cdot m + p(\neg Q)\cdot m$

$\frac{1}{2}\cdot d + p(\neg Q)\cdot -d = \frac{1}{2}\cdot m + p(\neg Q)\cdot m$

$d\left(\frac{1}{2} - p(\neg Q)\right) = m\left(\frac{1}{2} + p(\neg Q)\right)$

$$m = \frac{d\left(\frac{1}{2} - p(\neg Q)\right)}{\frac{1}{2} + p(\neg Q)}$$

If we assume the agent is probabilistic, $m = 0$

c) $100\,p(R) + 20\,p(\neg R) = 80\,p(R) + 80\,p(\neg R)$

$20\,p(R) = 60\,p(\neg R)$

$p(R) = 3\,p(\neg R)$

If we assume the agent is probabilistic, $p(R) = 3/4$

45) $cr(P) = cr(Q) = .3$ P, Q are mutually exclusive
$cr(P \vee Q) = .8$

Buy Contract 1 from Ash, which pays \$1 if P is true, and nothing otherwise. Pay Ash \$.30 for this contract.

Buy Contract 2 from Ash, which pays \$1 if Q is true, and nothing otherwise. Pay Ash \$.30 for this contract

Sell Contract 3 to Ash, which pays \$1 if $P \vee Q$ is true, and nothing otherwise. Receive \$.80 for this contract.

Net from buying/selling Contracts 1-3: +\$.20 (ignoring payouts)

If $P \wedge \neg Q$ is true: \$.20 + \$1 on Contract 1 − \$1 on Contract 3 = \$.20 net

If $\neg P \wedge Q$ is true: \$.20 + \$1 on Contract 2 − \$1 on contract 3 = \$.20 net

If $\neg P \wedge \neg Q$ is true: \$.20 net (no payout on any contract)

($P \wedge Q$ isn't possible, since P and Q are mutually exclusive.)

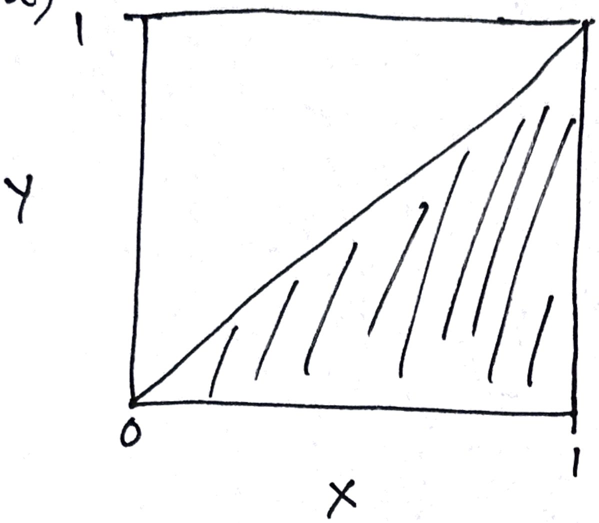
So, no matter which possible world is actual, I net + \$.20

46) a) By Problem #27d, if A logically entails B, then $p(B) \geq p(A)$. So, if Dot's credences obeyed the probability calculus, her cred(H) would be $\geq$ her cred($H \wedge G$), since $H \wedge G$ entails H. But that's false – her cred(H) $<$ her cred($H \wedge G$).

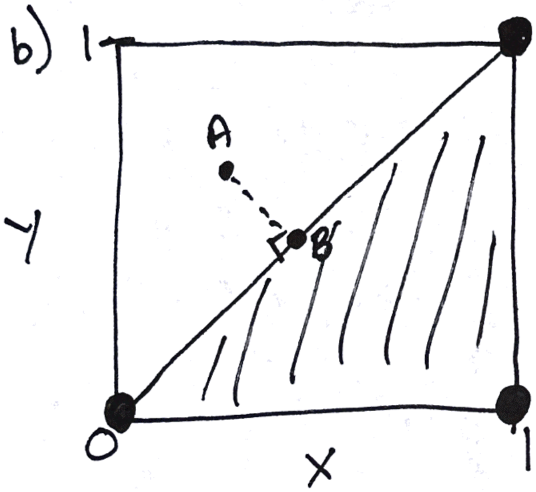
b) Buy Contract 1 from Dot, which pays \$1 if H is true, and nothing otherwise. Pay Dot \$.10 for this contract.
Sell Contract 2 to Dot, which pays \$1 if $H \wedge G$ is true and nothing otherwise. Receive \$.50 for this contract.
Net from buying/selling Contracts 1+2: + \$.40 (ignoring payouts)
If $\neg H$ is true: \$.40 and no payouts = \$.40 net
If $H \wedge G$ is true: \$.40 + \$1 on Contract 1 – \$1 on Contract 2 = \$.40 net
If $H \wedge \neg G$ is true: \$.40 + \$1 on Contract 1 = \$1.40 net
So, no matter which possible world is actual, I net either \$.40 or \$1.40

c) As in b), but sell Contract 1 to Dot, and buy Contract 2 from her.

47) a)



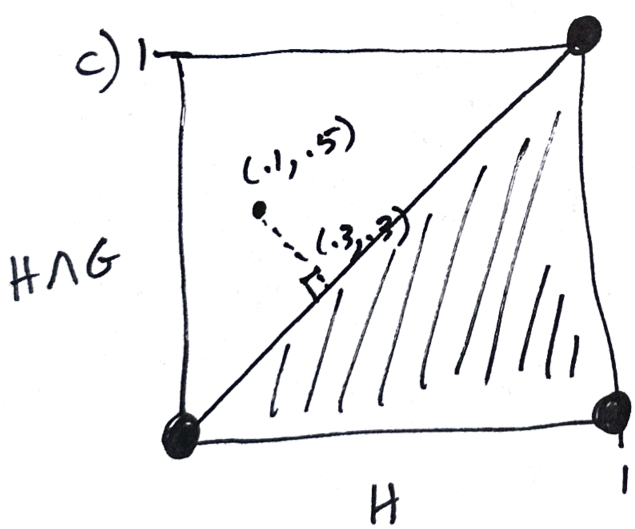
b)



The three large dots correspond to the three possible worlds. There's no dot at (0, 1) since Y entails X

If Alex's credence were outside the shaded region – say, at A – the point B orthogonally projected onto cr(Y) = cr(X) would be closer to all three possible worlds

c)



Here, this orthogonal projection of (.1, .5) onto cred(H∧G) = cred(H) is the point (.3, .3)

Brier Score of (.1, .5):

At (0,0): $.1^2 + .5^2 = .01 + .25 = .26$

At (1,0): $.9^2 + .5^2 = .81 + .25 = 1.06$

At (1,1): $.9^2 + .5^2 = 1.06$

Brier score of (.3, .3):

At (0,0): $.3^2 + .3^2 = .09 + .09 = .18$

At (1,0): $.7^2 + .3^2 = .49 + .09 = .58$

At (1,1): $.7^2 + .7^2 = .49 + .49 = .98$