PROBLEM 1

a) NAIVE BAYES ASSUMES THE INDEPENDENCE OF FEATURES. HERE, WE HAVE X = temperature and Y = season. WE CHECK FOR Independence between the X and Y features, resulting in $P(X|Y) = P(X)$ and $P(Y|X) = P(Y)$. SINCE $P(X) = P(Y) = 0.5$ BY MARGINALIZING THE TABLE.

b) $$P(Z=1 | A=0, B=1, C=0) = \frac{P(A=0, B=1, C=0 | Z=1) P(Z=1)}{P(A, B, C)}$$

↳ CAN BE REWRITTEN AS:

→ $P(A=0, B=1, C=0 | Z=1)$

$= P(A=0|Z=1) P(B=1|Z=1) P(C=0|Z=1)$

↳ WHICH RESULTS IN THE FOLLOWING PROBABILITIES:

$P(A=0) = .75$

$P(B=1) = .5$

$P(C=0) = .75$

$P(Z=1) = .75$

$P(A=0|Z=1) = .66$

$P(B=1|Z=1) = .33$

$P(C=0|Z=1) = .66$

→ PLUGGING IN THESE VALUES

↳ $$P(Z=1|A=0, B=1, C=0) = \frac{(.66)(.33)(.66)(.75)}{(.75)(.5)(.75)} \approx \boxed{.3833}$$

PROBLEM 2

$w_A = [1, 0, 0]$

$w_B = [0, 1, 1]$

$w_C = [0, 0, 1]$

FEATURE VECTOR	LABEL	w_A	w_B	w_C
		[1, 0, 0]	[0, 1, 0]	[0, 0, 1]
[1, -2, 3]	A	[2, -2, 3]	[-1, 1, -3]	[-1, 2, -2]
[1, 1, -2]	B	[1, -3, -1]	[0, 2, -5]	[-2, 1, 0]
[1, -1, 4]	C	[1, -3, -1]	[0, 2, -5]	[-2, 1, 0]