4i Let $V = \phi(0, s^2) + \sum_{k=1}^{n} \delta_k \phi(a, \sigma^2)$
where $\phi(\mu, \sigma^2)$ is a normal random number with mean μ, variance σ^2, and

~~Define~~ $\delta_k \sim$ Bernoulli (p)

Define $K \sim$ Binomial (n, p)
Then
$V = \phi(0, s^2) + \sum_{k=1}^{K} \phi(a, \sigma^2)$
$\quad = \phi(0, s^2) + \phi(Ka, K\sigma^2)$
$\quad = \phi(Ka, K\sigma^2 + s^2)$

Hence
$P(V) = \sum_{k=0}^{n} P_1(V | K = k) P_2(K = k)$
where $K \sim$ Binomial (n, p)
and $V | K = k \sim N(Ka, K\sigma^2 + s^2)$
Thus
$P(V = v) =$