

Answer:

$$p(t = 1|y = 1, x) = \frac{p(t = 1, y = 1, x)}{p(y = 1, x)} = p(y = 1|t = 1, x) \frac{p(t = 1, x)}{p(y = 1, x)}$$

$y|t$ is independent of x , and follows that $p(y = 1|t = 1, x) = \alpha$, and that
 $p(y = 1, x) = p(y = 1|t = 1, x)p(t = 1, x) + p(y = 1|t = 0, x)p(t = 0, x) = \alpha p(t = 1, x)$