P1. If a decreases too fast; it may ~~prevent~~ converge before the opt. point is found.

$w^t = w^{t-1} - \alpha \nabla J(w^{t-1})$.

with $J = w^2$ & $w^{(0)} = 1$.

$\alpha^{(0)} = 0.1$ $\quad a^t = \frac{1}{10} \cdot a^{t-1}$

$w^1 = 1 - \alpha \cdot J'(w^0) = 1 - 0.2 = 0.8$

$w^2 = 0.8 - 0.16 = 0.64$

$w^3 = 0.512 \quad w^4 = 0.4096$.

→. $w^5 = 0.32768 \ldots\ldots w^{21} = 0.009223$. about to converge.

but if $a^{(0)} = 0.01$

$w^1 = 0.98 \quad w^2 = 0.9604 \quad w^3 = 0.941192$

it is converging. a lot earlier before opt.

P2: a) 1/3.

b) $P(A=1|B=1) = \dfrac{P(A=1)P(B=1|A=1)}{P(A=1)P(B=1|A=1) + P(A=2)P(B=1|A=2) + P(A=3)P(B=1|A=3)}$.

$= \dfrac{1/3 \times 1/2}{1/3 \times 1/2 + 1/3} = \dfrac{1}{3}$.

so $P(\text{car behind door } 2) = 1 - \frac{1}{3} = \frac{2}{3}$.

c). Yes. open door2 has higher possibility.

$P(A=2|B=1) = 2/3$.

$P(A=1|B=1) = 1/3$.

$2/3 > 1/3$.

∴ Door 2.

P3: $E_{x \sim p(x)}[af(x) + bg(x)]$.

$= \sum_x p(x)(af(x) + bg(x))$.

$= \sum_x ap(x)f(x) + \sum_x bp(x)g(x)$.

$= a\sum_x p(x)f(x) + b\sum_x p(x)g(x)$

$= aE(f(x)) + bE(g(x))$.

∴ linear system.