# AI Week 3

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Question 1 $\psi^R$

Question 2 $\frac{1}{2} \cdot \psi^R$

Question 3 $\lim_{n\to\infty} \frac{\log(n)}{n} = \frac{\frac{1}{n}}{1} = \frac{1}{n}$

2. 1. $E_{(x,y)\sim P}[I[f_0(x) \neq y]] = P(x^{(1)} < 0 | Y=-1) \cdot [I f_0(x) \neq y] \cdot P(Y=-1)$
$+ P(x^{(1)} > 0 | Y=-1) \cdot [I f_0(x) \neq y] \cdot P(Y=-1)$
$+ P(x^{(1)} < 0 | Y=+1) \cdot [I f_0(x) \neq y] \cdot P(Y=+1)$
$+ P(x^{(1)} > 0 | Y=+1) \cdot [I f_0(x) \neq y] \cdot P(Y=-1)$
$= 0.5 \times 0 \times P(Y=-1) + 0.5 \times 1 \times P(Y=-1)$
$+ 0.5 \times 0 \times P(Y=+1) + 0.5 \times 1 \times P(Y=+1)$
$= 0.5 \, [P(Y=-1) + P(Y=+1)] = 0.5$

$\frac{N}{2}+1$ 2. $P([f(x_0) = y])^N$, $0.5^N$

$P\{k, D, N\} \sim 0.5^{kN} (1-0.5^N)^{D-k}$

4. $1-(1-0.5^N)^D$

5. $\lim_{D\to\infty} 1-(1-0.5^N)^D = 1$

3. $52 \times 228 \times 137 \xrightarrow{17 \times 15 \times 153} 15$

① $15 \times \frac{228+6-17+1}{5} \times \frac{137+6-15+1}{3}$

$= 15 \times 44 \times 43$

② $15 \times \frac{44-3+1}{2} \times \frac{43-3+1}{2} = 15 \times 21 \times 21$

③ $\# = 17 \times 15 \times 153 - 52 \times 15 + 15 = 198915$