Homework2

Corley Herman

9/26/16

Question 2.1:

$E_{out}(g) \leq E_{in}(g) + \sqrt{\frac{1}{2N} ln(\frac{2M}{\delta})}$

$\varepsilon(M, N, \delta) \leq \sqrt{\frac{1}{2N} ln(\frac{2M}{\delta})}$

$N \geq \frac{1}{2\varepsilon^2} ln(\frac{2M}{\delta})$

Question 2.1a:

$N \geq \frac{1}{2(0.05^2)} ln(\frac{2(10)}{0.03})$

$N \geq \frac{1}{0.005} ln(\frac{2000}{3})$

$N \geq 200(6.5)$

$N \geq 1300$

Question 2.1b:

$N \geq \frac{1}{2(0.05^2)} ln(\frac{2(100)}{0.03})$

$N \geq \frac{1}{0.005} ln(\frac{20000}{3})$

$N \geq 200(8.8)$

$N \geq 1761$

Question 2.1c:

$N \geq \frac{1}{2(0.05^2)} ln(\frac{2(10000)}{0.03})$

$N \geq \frac{1}{0.005} ln(\frac{20000}{0.03})$

$N \geq 200(13.4)$

$N \geq 2682$

Question 2.11:

$E_{out}(g) \leq E_{in}(g) + \sqrt{\frac{8}{N} ln(\frac{4m_{\mathcal{H}}(2N)}{\delta})}$

Part 1 - $N = 100$ $E_{out}(g) \leq E_{in}(g) + \sqrt{\frac{8}{100} ln(\frac{4(2N+1)}{0.1})}$

$E_{out}(g) \leq E_{in}(g) + \sqrt{0.08 ln(8040)}$

$E_{out}(g) \leq E_{in}(g) + 0.85$

Part 2 - $N = 10000$ $E_{out}(g) \leq E_{in}(g) + \sqrt{\frac{8}{10000} ln(\frac{4(2N+1)}{0.1})}$

$E_{out}(g) \leq E_{in}(g) + \sqrt{0.0008 ln(800040)}$

$E_{out}(g) \leq E_{in}(g) + 0.1$

Question 2.12:

$N \geq \frac{8}{\varepsilon^2} ln(\frac{4((2N)^{10}+1)}{\delta})$

$N \geq \frac{8}{0.05^2} ln(\frac{4((2N)^{10}+1)}{0.05})$

$N \geq \frac{8}{0.025}(ln(4(1024N^{10}+1)) - ln(0.05))$

$N \geq 3200(ln(4096) + 10ln(N) + ln(4) - ln(0.05))$

$N \geq 3200(ln(\frac{4096(4)}{0.05}) + 10ln(N))$