Homework 2-4

① $0<\left|x-\frac{2}{3}\right|<\delta$ & $\left|\frac{1}{x}-1.5\right|<0.7$

largest delta

$-\varepsilon<\frac{1}{x}-1.5<x$ & $-\varepsilon+1.5<\frac{1}{x}<\varepsilon+1.5$

$\left(\frac{1}{-\varepsilon+1.5}\right)-\frac{2}{3}<\delta<\frac{1}{\varepsilon+1.5}$

which ever is the smallest $\forall$ $\varepsilon=0.7$ is largest δ ie $0.21\overline{22}$

② $0<|x-1|<\delta$ & $|\sqrt{x}-1|<0.7$

largest delta

$-\varepsilon<\sqrt{x}-1<\varepsilon$ & $(-\varepsilon+1)^2<x<(\varepsilon+1)^2$

$(-\varepsilon+1)^2-1<\delta<(\varepsilon+1)^2-1$

smallest value $\forall$ $\varepsilon=0.7$ is δ ie 0.91

③ $\lim_{x\to 0} f(x)=f(0)$ & $\lim_{x\to 0^+} f(x)=f(0)$

$\delta=\varepsilon^2$; $\delta=\sqrt{\varepsilon}$; $\delta=\varepsilon$

then $f(x)=\sqrt{x}$; $f(x)=x^2$; $f(x)=x$

⑨ $0<|x-1.5|<\delta$ & $\left|\frac{1}{x^2}-\frac{1}{1.5^2}\right|<1$

largest delta

$-\varepsilon<\frac{1}{x^2}-\frac{1}{1.5^2}<\varepsilon \Rightarrow -\varepsilon+\frac{1}{1.5^2}<\frac{1}{x^2}<\varepsilon+\frac{1}{1.5^2}$

$\sqrt{\frac{1}{-\varepsilon+\frac{1}{1.5^2}}}-1.5<\delta<\sqrt{\frac{1}{+\varepsilon+\frac{1}{1.5^2}}}-1.5$

smallest value $\forall$ $\varepsilon=1$ is δ (ie) 0.6679

④ $A=\pi r^2$; $A=1175$; $r=\sqrt{\frac{1175}{\pi}}$ ②

$0<\left|x-\sqrt{\frac{1175}{\pi}}\right|<\delta$ & $|\pi x^2-1175|<\varepsilon$

$-\varepsilon+1175<\pi x^2<\varepsilon+1175$ and

$\sqrt{\frac{\pm\varepsilon+1175}{\pi}}-\sqrt{\frac{1175}{\pi}}<\delta$ then smallest delta is assumed

⑤ There is some $\varepsilon>0$ such that $\forall$ all $\delta>0$ there is some x such that $0<|x-c|<\delta$ but $|f(x)-L|>\varepsilon$

⑥ Use the graph to just approximate the value. No need to calculate anything

⑦ Same as the previous question.

⑧ Same logic as previous two questions