1) $f(x)=\frac{1}{16}x^4-x^3+3$ $[1,2]$ $f(x)$ is continuous AND $f(1)=\frac{1}{16}-1+3>0$ $f(2)=1-8+3<0$ Then By IVT, $f(x)=0$ in $(1,2)$	2) $f(x)=x^3+3x-2$ $[-2,1]$ $f(x)$ is continuous AND $f(-2)=-8-6-2<0$ $f(1)=1+3-2>0$ then By IVT, $f(x)=0$ in $(-2,1)$
3) $f(x)=x^2-x-\cos x$ $[0,\pi]$ Since $f(x)$ is continuous AND $f(0)=-1<0$ $f(\pi)=\pi^2-\pi+1>0$ Then By IVT, $f(x)=0$ in $(0,\pi)$	4) $f(x)=x^3+x-1$ $[-1,1]$ Since $f(x)$ is continuous AND $f(-1)=-3<0$ $f(1)=1>0$ Then by IVT, $f(x)=0$ in $(-1,1)$
5) $f(x)=x^2-6x+8$ $[0,3]$ $f(c)=5$ $f(x)$ is continuous AND $f(0)=8>5$ $f(3)=-1<5$ Then by IVT, $f(c)=5$ in $(0,3)$	6) $f(x)=x^3-x^2+x-2$ $[0,3]$; $f(c)=4$ $f(x)$ is continuous AND $f(0)=-2<4$ $f(3)=19>4$ Then by IVT, $f(c)=4$ in $(0,3)$

7) Since $h(x)$ is continuous, IVT applies.

$$\left.\begin{array}{l} h(0)=100>43 \\ h(5)=40<43 \end{array}\right\} h(x)=43 \text{ in } (0,5)$$

$$\left.\begin{array}{l} h(10)=40<43 \\ h(15)=110>43 \end{array}\right\} h(x)=43 \text{ in } (10,15)$$

$$h(20)=30<43 \;\Big\}\; h(x)=43 \text{ in } (15,20)$$

$$\left.\begin{array}{l} h(25)=10<43 \\ h(30)=50>43 \end{array}\right\} h(x)=43 \text{ in } (25,30)$$

* $h(x)=43$ at least 4 times

8) $w(t)=2000e^{t^2/20}$ $w(t)$ & $R(t)$ are continuous, IVT applies

$w(0)=2000 > R(0)=1340$

$w(8)=81.524 < R(8)=700$

$w(t)=R(t)$ in $(0,8)$

9)	10)
a) $\lim_{x\to c} f(x)$ DNE b) $f(c)$ is undefined c) $f(c) \neq \lim_{x\to c} f(x)$ d) $\lim_{x\to c} f(x)$ DNE	$f(x)=\begin{cases} \frac{1}{x}, & x\le -1 \\ \frac{x-1}{2}, & -1<x<1 \\ \sqrt{x}, & x\ge 1 \end{cases}$ I. $f(-1)=-1$ II. $\lim_{x\to -1^-} f(x)=-1=\lim_{x\to -1^+} f(x)=-1$ $\lim_{x\to -1} f(x)=-1$ III $f(-1)=\lim_{x\to -1} f(x)$ $f(x)$ is continuous at $x=-1$.