Math 151

Spring 2004

Exam 1 Review

(1.) Find the indicated limit. JUSTIFY EACH STEP.

(a.) $\lim_{x\to 2} \dfrac{2x+1}{5-3x}$

(b.) $\lim_{w\to -2} \sqrt{-3w^3+7w^2}$

(2.) Find the indicated limits:

(a.) $\lim_{h\to 0} \dfrac{\cos(2+h)-\cos(2)}{h}$

(b.) $\lim_{\theta\to 0} \dfrac{\sin 3\theta}{2\theta}$

(c.) $\lim_{t\to 3^-} \dfrac{t^2}{9-t^2}$

(d.) $\lim_{x\to\infty} \dfrac{\sin x}{x}$

(e.) $\lim_{x\to\infty} \sqrt{3x^2+5}-\sqrt{3x^2-2}$

(f.) $\lim_{x\to 4} \dfrac{x-4}{\sqrt{x}-2}$

(3.) Show that the given equation has at least one real solution.

(a.) $t^4+t^2-7t=-4$

(b.) $\sin\theta+\cos\theta=\theta^2$

(4.) Let $f(x)=\frac{x+1}{x^2-1}$. Find the indicated limits:

(a.) $\lim_{x\to 1^-} f(x)$

(b.) $\lim_{x\to 1^+} f(x)$

(c.) $\lim_{x\to\infty} f(x)$

(d.) $\lim_{x\to -1} f(x)$

(5.) For the given $f(x)$, find the values of a and b which make $f(x)$ continuous everywhere.

(a.) $f(x)=\begin{cases} 2x-1 & \text{if } x<1 \\ ax+b & \text{if } 1\le x<2 \\ -x & \text{if } x\ge 2 \end{cases}$

(b.) $f(x)=\begin{cases} 2x^2+1 & \text{if } x<-1 \\ ax+b & \text{if } -1\le x<1 \\ x+1 & \text{if } x\ge 1 \end{cases}$

(6.) Prove the given limit using an $\epsilon-\delta$ proof.

(a.) $\lim_{x\to 2} \sqrt{3x+1}=\sqrt{7}$

(b.) $\lim_{x\to 2} x^2-3x=-2$