Labs 2, Math. 249, Feb. 1, 2005

1 Let $f(x)$, $g(x)$ be continuous functions with $g(4)=4$, and such that $\lim_{x\to 2}\left[2f(x)-g(x)\right]=14$.

Then (a) $f(4)=$ _____ (b) $\lim_{x\to 4} f(x) =$ _____

2 If f is a function with $f(1)=4$ and $\lim_{x\to 1} f(x)=6$ can f be continuous at $x=1$?

3 If $\lim_{x\to 3} = \infty$ could $f(x)$ be continuous at $x=3$? _____

4 Let $f(x) = \begin{cases} \dfrac{1-x^3}{1-x^2}, & x\neq 1 \\ k & x=1 \end{cases}$

If $f(x)$ is continuous at $x=1$ then $k=$ _____

5 If f and g are discontinuous at $x=a$ then $f+g$ is discontinuous at $x=a$ True or False

6 $\lim_{x\to-\infty}\left(\dfrac{\sqrt{3x^4+4}}{x}\right)=$ _____ 7 $\lim_{x\to 3}\left(\dfrac{\sqrt{x^2+2}-\sqrt{11}}{x-3}\right)=$ _____

8 $\lim_{x\to 4}\left(\dfrac{x^2-4x}{|x|-4}\right)=$ _____ 9 $\lim_{x\to -4}\left(\dfrac{x^2-4x}{|x|-4}\right)=$ _____

Answers: 1(a): 9, 1(b): 9, 2 No: for continuity we must have limit = function value 3 No: for continuity at $x=3$ we must have a finite limit as $x\longrightarrow 3$ 4 $k=\frac{3}{2}$ 5 False: take any f that is discontinuous at $x=a$, but $g=-f$. Then f, g are discontinuous at $x=a$ but $f+g$ is continuous at $x=a$. 6: $-\sqrt{3}$ (for x negative, $\sqrt{x^2}=-1$) 7: $\frac{3}{\sqrt{11}}$ 8: 4, 9: No limit