Math 181 quiz 1 (1.1-1.3) Name: Key

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Find the following limits:

1. $\lim\limits_{x\to 5}\left(x^2-5x\right)=5^2-5(5)=25-25=0$ 1. 0

Direct substitution.

2. $\lim\limits_{x\to -4}\dfrac{x^2-16}{x+4}=\lim\limits_{x\to -4}\dfrac{(x+4)(x-4)}{x+4}=\lim\limits_{x\to -4}(x-4)=-4-4=-8$ 2. -8

Can't directly substitute- why?

3. $\lim\limits_{x\to 2}\dfrac{|x-2|}{x-2}\,dne$ since the RHL $\neq$ LHL, i.e $-1\neq 1$ 3. dne

$\lim\limits_{x\to 2^-}\dfrac{-(x-2)}{x-2}=\lim\limits_{x\to 2^-}(-1)=-1,\ \lim\limits_{x\to 2^+}\dfrac{x-2}{x-2}=\lim\limits_{x\to 2^-}(1)=1$

Or look at graph.

4. $\lim\limits_{x\to 0}\dfrac{\sin 2x}{x}=\lim\limits_{x\to 0}\dfrac{2\sin 2x}{2x}=2\lim\limits_{x\to 0}\dfrac{\sin 2x}{2x}=2(1)=2$ 4. 2

Can't directly substitute. Use identity.

5. $\lim\limits_{x\to 4}\dfrac{\sqrt{x-2}}{x+7}=\dfrac{\sqrt{4-2}}{4+7}=\dfrac{\sqrt{2}}{11}$ 5. $\dfrac{\sqrt{2}}{11}$

Direct substitution.

6. $\lim\limits_{x\to 1}\sin\left(\frac{\pi}{3}x\right)=\lim\limits_{x\to 1}\sin\left(\frac{\pi}{3}\cdot 1\right)=\sin\dfrac{\pi}{3}=\dfrac{\sqrt{3}}{2}$ 6. $\dfrac{\sqrt{3}}{2}$

Direct substitution.

7. $\lim\limits_{x\to \frac{2\pi}{3}}\cos x=\cos\dfrac{2\pi}{3}=-\dfrac{1}{2}$ 7. $-\dfrac{1}{2}$

Direct substitution.

8.
$$\lim_{x\to 3}\frac{\sqrt{x+1}-2}{x-3}=\lim_{x\to 3}\left[\frac{\sqrt{x+1}-2}{x-3}\cdot\frac{\sqrt{x+1}+2}{\sqrt{x+1}+2}\right]=\lim_{x\to 3}\frac{x+1-4}{(x-3)(\sqrt{x+1}+2)}$$
$$=\lim_{x\to 3}\frac{x-3}{(x-3)(\sqrt{x+1}+2)}=\lim_{x\to 3}\frac{1}{\sqrt{x+1}+2}=\frac{1}{\sqrt{3+1}+2}=\frac{1}{2+2}=\frac{1}{4}$$

Can not directly evaluate – why??

Note: $\lim\limits_{x\to a}f(x)\neq f(x)$**. One is limit as x approaches *a* and the other is a function evaluated at *x*. They are not the same thing. Otherwise why would we use limits??**