Name Key

#5 Limits, Continuity, & IVT

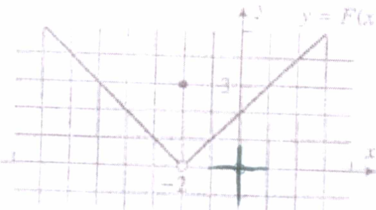
1. For the function F graphed in the accompanying figure, find

a) $\lim_{x\to -2^-} F(x)$ = 0

b) $\lim_{x\to -2^+} F(x)$ = 0

c) $\lim_{x\to -2} F(x)$ = 0

d) $F(-2)$ = 3



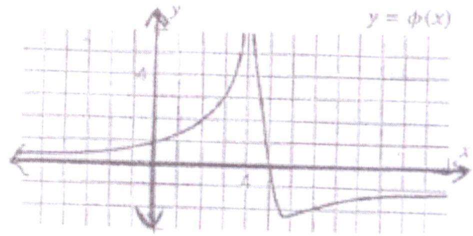
2. For the function ϕ graphed in the accompanying figure, find

a) $\lim_{x\to 4^-} \phi(x)$ ∞

b) $\lim_{x\to 4^+} \phi(x)$ ∞

c) $\lim_{x\to 4} \phi(x)$ ∞

d) $\phi(4)$ DNE



3. $f(x)=\begin{cases} x-1, & x\le 3 \\ 3x-7, & x>3 \end{cases}$ Find $\lim_{x\to 3^-} f(x)$

TYPO

= 2

4. $g(t)=\begin{cases} t^2, & t\ge 0 \\ t-2, & t<0 \end{cases}$

a) Find $\lim_{x\to 0^-} g(t)$ = −2

b) Find $\lim_{x\to 0} g(t)$ = DNE

5. Find $\lim_{x\to 3} f(x)$ where $f(x)=\begin{cases} \dfrac{x+2}{2}, & x\le 3 \\ \dfrac{12-2x}{3}, & x>3 \end{cases}$

$\frac{3+2}{2}=5$ $\frac{12-2(3)}{3}=\frac{6}{3}=3$

DNE

6. Find $\lim_{x\to 2} f(x)$ where

$f(x)=\begin{cases} x^2-4x+6, & x<2 \\ -x^2+4x-2, & x\ge 2 \end{cases}$

2

$2^2-4(2)+6=2$

$-(2)^2+4(2)-2=2$

7. Find $\lim_{x\to 1} f(x)$ where $f(x)=\begin{cases} x^3+1, & x<1 \\ x+1, & x\ge 1 \end{cases}$

$1+1=2$

$1+1=2$

2

8. Find $\lim_{x\to 1} f(x)$ where $f(x)=\begin{cases} x, & x\le 1 \\ 1-x, & x>1 \end{cases}$

DNE

9. If possible, choose k so that the following function is continuous on any interval:

$f(x)=\begin{cases} \dfrac{5x^3-10x^2}{x-2}, & x\ne 2 \\ k, & x=2 \end{cases}$

$\frac{5x^2(x-2)}{x-2}$ $5(2)^2=k$

$5\cdot 4=k$

$20=k$

10. Find a value of the constant k, if possible, that will make the function continuous everywhere.

a) $f(x)=\begin{cases} 7x-2, & x\le 1 \\ kx^2, & x>1 \end{cases}$

$7-2=k$

$K=5$

b) $f(x)=\begin{cases} kx^2, & x\le 2 \\ 2x+k, & x>2 \end{cases}$

$4k=4+k$

$3k=4$

$K=4/3$

11. Show that there is a number c, with $0\le c\le 1$, such that $f(c)=0$ for $f(x)=x^3+x^2-1$.

$f(0)=-1$

$f(1)=1$

f(x) continuous ✓

Since f is continuous and f(0) = −1 and f(1) = 1, there must be a zero on [0,1] by the IVT.

12. Show that there is a number c, with $0\le c\le 1$, such that $f(c)=0$ for $f(x)=e^x-3x$.

$f(0)=e^0-0=1$

$f(1)=e-3 \approx 2.7-3=-\#$

Since f is continuous and f(0) > 0 and f(1) < 0, there must be a zero on [0,1] by the IVT.