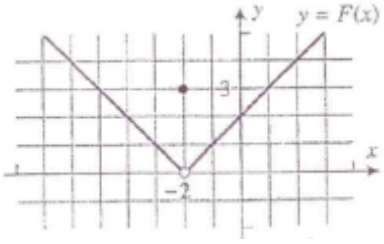
Name_____ **#5 Limits, Continuity, & IVT**

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



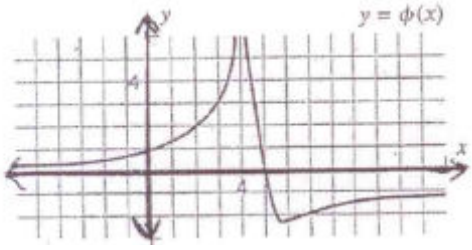
a) $\lim_{x\to -2^-} F(x)$

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

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

d) $F(-2)$

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) $\phi(4)$

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

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

a) Find $\lim_{x\to 0^-} g(t)$ b) Find $\lim_{x\to 0} g(t)$

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

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

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

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

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

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

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

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

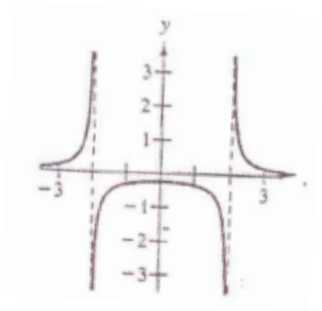
11. Show that there is a number *c*, with $0\le c\le 1$, such that $f(c)=0$ for $f(x)=x^3+x^2-1$.

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

13. Show that there is a number c, with $0 \le c \le 1$, such that $f(c) = 0$ for $f(x) = x - \cos x$.

14. Find the x-value(s) (if any) at which f is not continuous.

$$f(x) = \frac{1}{x^2 - 4}$$



15. Find the x-value(s) (if any) at which f is not continuous.

$$f(x) = \begin{cases} x, & x < 1 \\ 2, & x = 1 \\ 2x - 1, & x > 1 \end{cases}$$

16. Find the x-value(s) (if any) at which f is not continuous.

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

17. Find the x-value(s) (if any) at which f is not continuous.

$$f(x) = \begin{cases} -2x + 3, & x < 1 \\ x^2, & x \ge 1 \end{cases}$$

18. Find the x-value(s) (if any) at which f is not continuous.

$$f(x) = \begin{cases} \frac{x}{2} + 1, & x < 2 \\ 3 - x, & x > 2 \end{cases}$$

19. Find the x-value(s) (if any) at which f is not continuous.

$$f(x) = \begin{cases} -2x, & x \le 2 \\ x^2 - 4x + 1, & x > 2 \end{cases}$$

20. Evaluate:

a) $\lim_{x \to 2} (4x^2 - 5x + 3)$ b) $\lim_{x \to -3} \frac{x^2 + x - 6}{x + 3}$

21. Evaluate:

a) $\lim_{x \to \frac{\pi}{2}} \sec x$ b) $\lim_{x \to 0} |x|$ c) $\lim_{x \to 0} \frac{|x|}{x}$

22. Determine if the Intermediate Value Theorem holds for the given value of k on the given interval. If it does, find a number c for which $f(c) = k$. If it does not hold, give the reason. Finally, draw a sketch of the curve and the line $y = k$.

a) $f(x) = \frac{1}{x - 2}$, $[2.5, 7]$, $k = \frac{1}{4}$

b) $f(x) = \sqrt{4 - x^2}$, $[-2, 2]$, $k = 1$