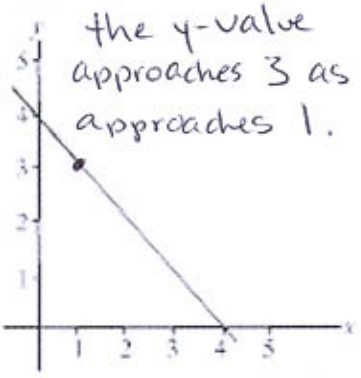
Chapter 1 Practice Test

NAME Solutions

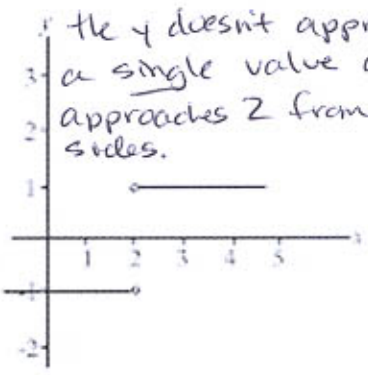
1.2 Finding Limits Graphically and Numerically

Give the limit for each one by looking at the graph of f(x).

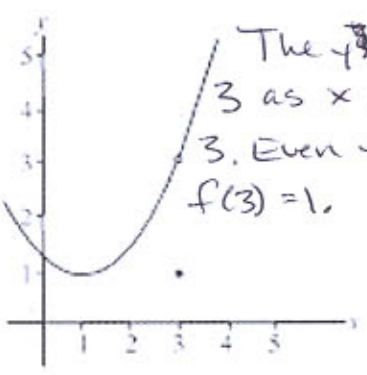
1. $\lim_{x\to 1} f(x) = 3$



2. $\lim_{x\to 2} f(x) =$ D.N.E.



3. $\lim_{x\to 3} f(x) = 3$



Calculate the following limit numerically by completing the table given.

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

x	-3.1	-3.01	-3.001	-2.999	-2.99	-2.9
$f(x)$	-.2485	-.2498	-.25	-.25	-.2502	-.2516

lim= -.25

1.3 Elvaluating Limits Algebraically

Calculate the following limits using direct substitution when possible. If not possible divide out factors, then solve with direct substitution.

5. $\lim_{x\to -3}(3x+2) = -7$

$3(-3)+2 = -7$

6. $\lim_{x\to 1}(-x^2+1) = 0$

$-(1)^2+1 = 0$

7. $\lim_{x\to -3} \dfrac{2}{x+2} = -2$

$\dfrac{2}{-3+2} = \dfrac{2}{-1} = -2$

8. $\lim_{x\to 4} \dfrac{x^2-5x+4}{x^2-2x-8} = \dfrac{1}{2}$

$\dfrac{(x-4)(x-1)}{(x-4)(x+2)} = \dfrac{4-1}{4+2} = \dfrac{3}{6} = \dfrac{1}{2}$

9. $\lim_{x\to 3} \dfrac{\sqrt{x+1}-2}{x-3} = \dfrac{1}{4}$

$\dfrac{(\sqrt{x+1}-2)(\sqrt{x+1}+2)}{(x-3)(\sqrt{x+1}+2)} = \dfrac{\sqrt{x+1}^2-2^2}{(x-3)(\sqrt{x+1}+2)} = \dfrac{x+1-4}{(x-3)(\sqrt{x+1}+2)} = \dfrac{x-3}{(x-3)(\sqrt{x+1}+2)} = \dfrac{1}{\sqrt{3+1}+2} = \dfrac{1}{4}$

10. $\lim_{x\to 0} \dfrac{\sin x}{4x} = \dfrac{1}{4}$

$\dfrac{\sin x}{4x} = \dfrac{\sin x}{x} \cdot \dfrac{1}{4} = 1 \cdot \dfrac{1}{4}$ (lim = 1, lim = $\frac{1}{4}$)

1.4 Continuity and One-Sided Limits

Find any x-values at which f is not continuous. Tell whether these points of discontinuity are removable or non-removable. (Continued on next page)

11. $f(x) = x^2 + 3\sin x$

Continuous

12. $f(x) = \dfrac{x}{x^2-1}$

-1 non-removable

1 non-removable

$\dfrac{x}{(x+1)(x-1)}$ ← can't cancel so non-removable

$x+1=0 \quad x=-1$

$x-1=0 \quad x=1$

13. $f(x) = \dfrac{x^2-4}{x+2}$

-2 removable

$\dfrac{(x+2)(x-2)}{(x+2)}$ ← cancels so removable

14. $f(x)=\dfrac{x-1}{x^2+x-2}$

$\frac{x-1}{(x+2)(x-1)}$ -2 non removable, 1 removable

15. $f(x)=\cos \pi x$ continuous

Find the limit if it exists, if it does not exist, explain why.

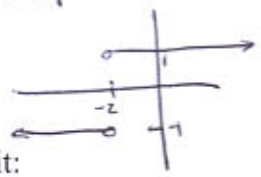
16. $\lim\limits_{x\to 2^+}\dfrac{x+2}{x^2-4}$

D.N.E or ∞

the limit is unbounded towards ∞. We can describe this as not existing or $+\infty$.

17. $\lim\limits_{x\to -2^-}\dfrac{|x+2|}{x+2}=-1$

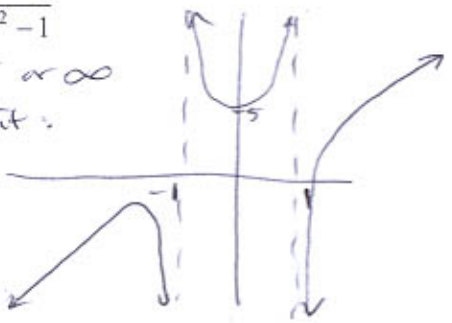
Graph it:



18. $\lim\limits_{x\to 1^-}\dfrac{x^3-5}{x^2-1}$

DNE or ∞

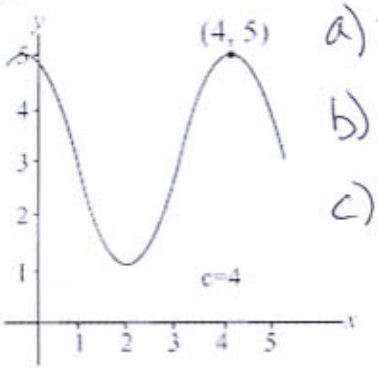
Graph it:



Use the graph to determine the limit:

a) $\lim\limits_{x\to c^+} f(x)$ b) $\lim\limits_{x\to c^-} f(x)$ c) $\lim\limits_{x\to c} f(x)$

19.

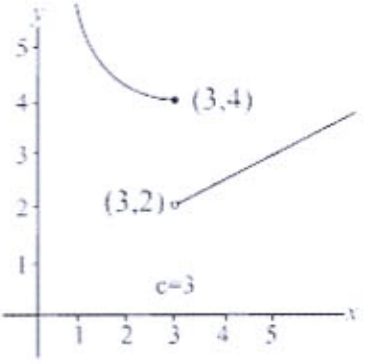


a) 5

b) 5

c) 5

20.



a) 2

b) 4

c) D.N.E.

1.5 Infinite Limits

Find the Vertical Asymptotes of the function, if they exist.

21. $f(x)=\dfrac{-4x}{x^2+4}$

none

x^2+4 doesn't factor and no value for x will make it = 0

22. $f(x)=\dfrac{x^2}{x^2+x}$

$\frac{x^2}{x(x+1)}$

V.A. at -1 (0 is a hole)

23 $f(x)=\dfrac{x^2-4}{x^2+3x+2}$

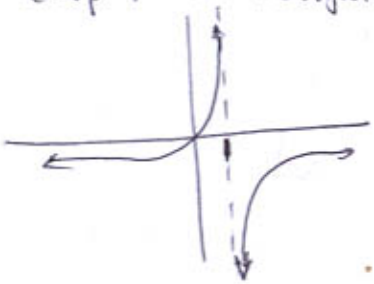
$\frac{(x+2)(x-2)}{(x+2)(x+1)}$

V.A. at -1 (-2, is a hole)

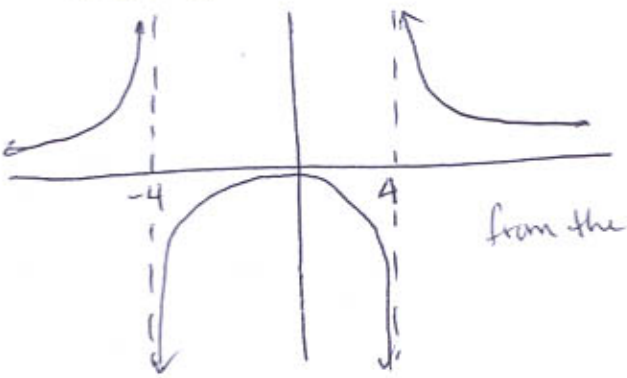
Find the Limit

24. $\lim\limits_{x\to 1^+}\dfrac{2+x}{1-x}=-\infty$

Graph: from the right of 1



25. $\lim\limits_{x\to 4^-}\dfrac{x^2}{x^2-16}=-\infty$



from the left of 4