P66; 7–35 odd, 43–49 odd, 55–59

7. $-\frac{3}{2}$
9. -15
11. 0
13. 4

All can be done as simple substitution (Type 1)

15. a)

x	-0.1	-0.01	-0.001	-0.0001
$f(x)$	1.56667	1.959697	1.995997	1.999600

b)

x	0.1	0.01	0.001	0.0001
$f(x)$	2.3727	2.039703	2.003997	2.000400

$\lim_{x\to 0} f(x) = 2$

17. a)

x	-0.1	-0.01	-0.001	-0.0001
$f(x)$	-0.0544	-0.00506	-0.000827	-0.000031

b)

x	0.1	0.01	0.001	0.0001
$f(x)$	-0.0544	-0.00506	-0.000827	-0.000031

$\lim_{x\to 0} f(x) = 0$

19. a)

x	-0.1	-0.01	-0.001	-0.0001
$f(x)$	2.0567	2.2763	2.2999	2.3023

b)

x	0.1	0.01	0.001	0.0001
$f(x)$	2.5893	2.3293	2.3052	2.3029

$\lim_{x\to 0} f(x) = 2.3$

21. $\lim_{x\to -2} \sqrt{x-2}$ cannot be evaluated with substitution because the expression is not defined at $x=-2$ and the interval around $x=-2$. DNE

23. $\lim_{x\to 0} \frac{|x|}{x}$ cannot be evaluated b/c $\lim_{x\to 0^-} f(x) \neq \lim_{x\to 0^+} f(x)$. DNE

25. $\lim_{x\to 1} \frac{x-1}{x^2-1} = \lim_{x\to 1} \frac{x-1}{(x-1)(x+1)} = \lim_{x\to 1} \frac{1}{x+1} = \boxed{\frac{1}{2}}$

27. $\lim_{x\to 0} \frac{5x^3+8x^2}{3x^4-16x^2} = \lim_{x\to 0} \frac{x^2(5x+8)}{x^2(3x^2-16)} = \lim_{x\to 0} \frac{5x+8}{3x^2-16} = \frac{8}{-16} = \boxed{-\frac{1}{2}}$

minus

29. $\lim_{x\to 0} \frac{(2+x)^3-8}{x} = \lim_{x\to 0} \frac{x^3+6x^2+12x+8-8}{x} = \lim_{x\to 0} \frac{x^3+6x^2+12x}{x} = \lim_{x\to 0} x^2+6x+12 = \boxed{12}$

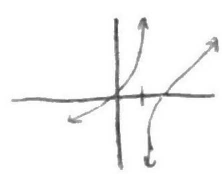
31. $\lim_{x\to 0} \frac{\sin(x)}{2x^2-x} = \lim_{x\to 0} \frac{\sin(x)}{x(2x-1)} = \lim_{x\to 0} \underbrace{\frac{\sin(x)}{x}}_{\to 1} \cdot \frac{1}{(2x-1)} = 1 \cdot \frac{1}{0-1} = \boxed{-1}$

33. $\lim_{x\to 0} \frac{\sin^2(x)}{x} = \lim_{x\to 0} \underbrace{\frac{\sin(x)}{x}}_{\to 1} \cdot \sin(x) = \boxed{0}$

35. $\lim_{x\to 1} \frac{x^2-4}{x-1} \Rightarrow$ DNE

$\lim_{x\to 1^-} \frac{x^2-4}{x-1} \Rightarrow \frac{1-4}{-\text{close to } 0} \Rightarrow \frac{-3}{-\text{close to } 0} \Rightarrow \infty$

$\lim_{x\to 1^+} \frac{x^2-4}{x-1} \Rightarrow \frac{1-4}{+\text{close to } 0} = \frac{-3}{+\text{close to } 0} = -\infty$



43.
a. True
b. True
c. False [f(0)=1]
d. True
e. True
f. True
g. False, lim is 0
h. False, lim DNE
i. False, lim DNE
j. False, lim is 0

45.
a. 3
b. -2
c. No limit
d. 1

47.
a. -4
b. -4
c. -4
d. -4

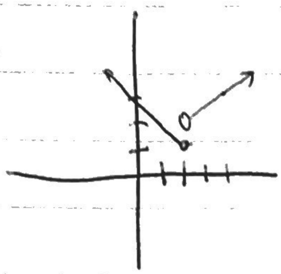
49.
a. 4
b. -3
c. No limit
d. 4

55. a. 6   b. 0   c. 9   d. -3   Limit rules!

56. a. $\lim_{x\to b}(f(x)+g(x)) = 7-3 = \boxed{4}$ b. $\lim_{x\to b}(f(x)\cdot g(x)) = 7(-3) = \boxed{-21}$

c. $\lim_{x\to b} 4g(x) = 4(-3) = \boxed{-12}$ d. $\lim_{x\to b}\frac{f(x)}{g(x)} = \boxed{\frac{7}{-3}}$

57. a.

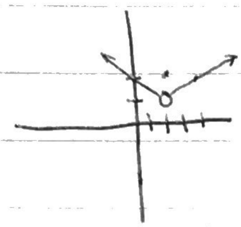


c=2 b. $\lim_{x\to c^+} f(x) = \lim_{x\to 2^+} f(x) = \lim_{x\to 2^+} \frac{x}{2}+1 = \boxed{2}$

$\lim_{x\to c^-} f(x) = \lim_{x\to 2^-} f(x) = \lim_{x\to 2^-} 3-x = \boxed{1}$

c. $\lim_{x\to c} f(x)$ doesn't exist b/c $\lim_{x\to c^+} f(x) \neq \lim_{x\to c^-} f(x)$

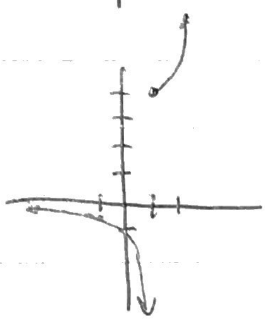
58.



c=2 b. $\lim_{x\to 2^+} \frac{x}{2} = \boxed{1}$ $\lim_{x\to 2^-} 3-x = \boxed{1}$

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

59.



c=1 b. $\lim_{x\to 1^+} f(x) = \lim_{x\to 1^+} x^3-2x+5 = \boxed{4}$

$\lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} \frac{1}{x-1} = -\infty$

c. $\lim_{x\to c} f(x)$ doesn't exist b/c $\lim_{x\to c^+} f(x) \neq \lim_{x\to c^-} f(x)$