

Calculus Limits 3.1

- ① C ② a ③ B ④ B & C ⑤ a) 3 b) 1 ⑥ a) 4 b) 4 ⑦ a) 0 b) DNE ⑧ a) 2 b) DNE

⑨ a) i)  $\lim_{x \rightarrow -2^-} f(x) = -1$

b) i)  $\lim_{x \rightarrow -1^-} f(x) = -\frac{1}{2}$

ii)  $\lim_{x \rightarrow -2^+} f(x) = -\frac{1}{2}$

ii)  $\lim_{x \rightarrow -1^+} f(x) = -\frac{1}{2}$

iii)  $\lim_{x \rightarrow -2} f(x) = \text{DNE}$

iii)  $\lim_{x \rightarrow -1} f(x) = -\frac{1}{2}$

iv)  $f(-2) = \text{DNE}$

iv)  $f(-1) = -\frac{1}{2}$

⑩ a) i)  $\lim_{x \rightarrow 1^-} f(x) = 1$

b) i)  $\lim_{x \rightarrow 2^-} f(x) = 0$

⑪ 3 ⑫  $\infty, \text{DNE}$

ii)  $\lim_{x \rightarrow 1^+} f(x) = 1$

ii)  $\lim_{x \rightarrow 2^+} f(x) = 0$

⑬ In #9 as  $x \rightarrow -2^+$  and  $x \rightarrow -2^-$ , ~~f(x)~~ f(x) goes to different values

iii)  $\lim_{x \rightarrow 1} f(x) = 1$

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

iv)  $f(1) = 2$

iv)  $f(2) = 0$

⑭  $f(x) \rightarrow 1$  as  $x \rightarrow 1$  on both sides

⑮ 4

|      |        |        |      |
|------|--------|--------|------|
| .9   | .99    | 1.01   | 1.1  |
| 5.02 | 5.0002 | 5.0002 | 5.02 |

$\lim_{x \rightarrow 1} f(x) = 5$

|       |         |         |         |         |       |
|-------|---------|---------|---------|---------|-------|
| -1.1  | -1.01   | -1.001  | -0.999  | -0.99   | -0.9  |
| -3.68 | -3.9698 | -3.9969 | -4.0029 | -4.0298 | -4.28 |

$\lim_{x \rightarrow -1} f(x) = -4$

|        |        |         |          |         |        |
|--------|--------|---------|----------|---------|--------|
| 2.9    | 2.99   | 2.999   | 3.001    | 3.01    | 3.1    |
| 12.991 | 127.11 | 1268.24 | -1267.66 | -126.51 | -12.39 |

$\lim_{x \rightarrow 3} f(x) = \text{DNE}$

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⑲  $\frac{1}{2}$  ⑳ 2

- ㉑ 3 ㉒ 3 ㉓ 512 ㉔ 100 ㉕  $\frac{2}{3}$  ㉖  $\frac{137}{-8}$

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- (31) 6 (32) -4 (33)  $\frac{3}{2}$  (34)  $\frac{6}{5}$  (35) -5 (36) 7 (37)  $\frac{1}{4}$   
(38)  $\frac{1}{4}$  (39)  $\frac{1}{10}$  (40)  $\frac{1}{12}$  (41)  $2x$  (42)  $3x^2$  (43)  $\frac{3}{7}$   
(44) 2 (45)  $\frac{3}{2}$  (46)  $\frac{1}{2}$  (47) 0 (48) 0 (49)  $\infty$ ; DNE  
(50)  $\infty$ ; DNE (51)  $-\infty$ ; DNE (52)  $-\infty$ ; DNE

(53) a) DNE

b)  $x = -2$

c)  $f(x)$  goes in opposite directions as  $x \rightarrow$  vertical asymptote which implies limit DNE

(54) a)  $-\infty$ ; DNE

b)  $x = 1$

c)  $f(x)$  goes in same direction as  $x \rightarrow$  vertical asymptote which implies limit is  $-\infty$ ; DNE

(6) Sometimes  $f(x)$  is not defined @ that  $x$ -value

(6) a) 0

b) yes @  $y = 0$