Chapter 2 Solutions  
MATH 251, CALCULUS I  

Section 2.1  

2. See solution to inclass example.  

5. (a) (i) $-32$ ft/s (ii) $-25.6$ ft/s (iii) $-24.8$ ft/s (iv) $-24.16$ ft/s  
   (b) The average velocities approach $-24$ ft/s, this is an estimate of the instantaneous velocity.  

8. (a) (i) $-6$ cm/s (ii) $-4.71$ cm/s (iii) $-6.13$ cm/s (iv) $-6.27$ cm/s  
   (b) The instantaneous velocity appears to be $-6.3$ cm/s  

Section 2.2  

2. As $x$ approaches 1 from the left, $f(x)$ approaches 3; and as $x$ approaches 1 from the right, $f(x)$ approaches 7. No, the limit does not exist because the left- and right-hand limits are different.  

7. (a) $\lim_{t \to 0^-} g(t) = -1$ (b) $\lim_{t \to 0^+} g(t) = -2$ (c) $\lim_{t \to 0} g(t)$ D.N.E because the limits in part (a) and (b) are not equal.  
   (d) $\lim_{t \to 2^-} g(t) = 2$ (e) $\lim_{t \to 2^+} g(t) = 0$ (f) $\lim_{t \to 2} g(t)$ D.N.E because the limits in part (e) and (f) are not equal.  
   $g(2) = 1$ (h) $\lim_{t \to 4} g(t) = 3$.  

8. (a) $\lim_{x \to 3^-} A(x) = \infty$ (b) $\lim_{x \to 2} A(x)$ D.N.E (see parts c and d) (c) $\lim_{x \to 2^-} A(x) = -\infty$ (d) $\lim_{x \to 2^+} A(x) = \infty$ (e) $\lim_{x \to -1} A(x) = \infty$.  

10. See solution to example from section 2.2 on course website.  

16.  

17. See figure on next page.  

31. $\lim_{x \to 5^+} \frac{x+1}{x-5} = \infty$ since the numerator is positive and the denominator approaches 0 from the positive side as $x \to 5^+$.  

33. $\lim_{x \to 1} \frac{2-x}{(x-1)^2} = \infty$ since the numerator is positive and the denominator approaches 0 through positive values as $x \to 1$.  

\[ \lim_{x \to 0} f(x) = 1, \quad \lim_{x \to 0^-} f(x) = -2, \quad \lim_{x \to 3^+} f(x) = 2, \quad f(0) = -1, \quad f(3) = 1 \]
\[
\lim_{x \to 0} f(x) = 1, \quad \lim_{x \to 3^-} f(x) = -2, \quad \lim_{x \to 3^+} f(x) = 2,
\]
\[
f(0) = -1, \quad f(3) = 1
\]