

Math 124  
Quiz 3  
Solutions

1. (a) 98 m/sec

$$\begin{aligned} \text{(b) } v(2+h) - v(2) &= 98 \left( \frac{2+h}{2+h+6} - \frac{2}{2+6} \right) \\ &= 98 \left( \frac{2+h}{8+h} - \frac{1}{4} \right) \\ &= 98 \frac{3h}{4(8+h)} \text{ m/sec} \end{aligned}$$

$$\begin{aligned} \text{(c) } \frac{v(2+h) - v(2)}{h} &= \frac{98 \cdot 3}{4(8+h)} \\ &= \frac{147}{2(8+h)} \text{ m/sec}^2 \end{aligned}$$

$$\text{(d) } \lim_{h \rightarrow 0} \frac{v(2+h) - v(2)}{h} = \frac{147}{16} \approx 9.19 \text{ m/sec}^2$$

(e) This is the acceleration and tells you that the velocity is changing at approximately 9 meters/sec per second at  $t = 2$ .

2. Since  $\lim_{x \rightarrow \pm\infty} f(x) = 1$ , the horizontal asymptote has equation  $y = 1$ . Since  $x^2 - 4x - 5 = (x - 5)(x + 1)$  and this denominator shares no roots with the numerator the equations of the vertical asymptotes are  $x = 5$  and  $x = -1$ .