P140. #7.

let f(x) refers the distance, then $f'(x)$ is the speed.

0	0									
0	0	75								
3	225	75	0	$\frac{2}{9}$						
3	225	77	$\frac{2}{3}$	$\frac{1}{15}$	-0.0315	-6.44×10^{-3}				
5	383	79	1	$-\frac{1}{4}$	-0.0633	1.167×10^{-2}	2.2638×10^{-3}			
5	383	80	$\frac{1}{2}$	$\frac{1}{10}$	0.03	-0.02867	-5.3413×10^{-3}	-9.1314×10^{-4}	1.3051×10^{-4}	$\frac{-2.0221\times10^{-3}}{105}$
8	623	80	0	$-\frac{2}{5}$	-0.1133	0.02279	5.145×10^{-3}	7.8356×10^{-4}	-1.3237×10^{-4}	
8	623	74	-2	$\frac{1}{4}$	0.1146	-0.01949	-4.228×10^{-3}	-9.373×10^{-4}		
13	993	74	0	$\frac{2}{-25}$	-0.0413					
13	993	72	$-\frac{2}{5}$							

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

$$Hq(x) = 0 + 75x + 0 + \tfrac{2}{9}x^2(x-3) + x^2(x-3)^2(-0.311) + x^2(x-3)^2(-6.44\times10^{-3})(x-5) +$$
$$x^2(x-3)^2(x-5)^2(2.2638\times10^{-3}) + x^2(x-3)^2(x-5)^2(x-8)(-9.1314\times10^{-4}) +$$
$$x^2(x-3)^2(x-5)^2(x-8)^2(1.3051\times10^{-4}) + (x-3)^2(x-5)^2x^2(x-8)^2(x-13)(-2.0221\times10^{-3})$$

a. $Hq(10) = 743$ ft $Hq'(10) = 48$ ft/s.

b. 55 mi/h = 80.67 ft/s = $Hq'(x)$

$x \approx 5.6488$.

c. $Hq''(x) = 0$ $\therefore x_0 \approx 12.37187$

$Hq'(x_0) \approx 11$~~99~~2 ft/s

P153. #9.

$S_0(1) = 1 = 1$

$S_0(2) = 1 + B + (-D) = 1$

$S_1(2) = 1 = 1$

$S_1(3) = 1 + b - \frac{3}{4} + d = 0$

$S_0'(2) = B - 3D$

$S_1'(2) = b = B - 3D$

$S_0''(2) = -6D$

$S_1''(2) = -\frac{3}{2}$

$$\begin{cases} B = D \\ \frac{1}{4} + b + d = 0 \\ B - 3D - b = 0 \\ 6D - \frac{3}{2} = 0 \end{cases}$$

$$\begin{cases} B = \frac{1}{4} \\ D = \frac{1}{4} \\ b = -\frac{1}{2} \\ d = \frac{1}{4} \end{cases}$$

#17.

0	1	$\frac{e^{0.1}-1}{0.05}$
0.05	$e^{0.1}$	$\frac{e^{0.2}-e^{0.1}}{0.05}$
0.1	$e^{0.2}$	

$$F(x) = \begin{cases} 1 + \frac{e^{0.1}-1}{0.05}x, & 0 \le x < 0.05 \\ e^{0.1} + \frac{e^{0.2}-e^{0.1}}{0.05}(x-0.05), & 0.05 \le x < 0.1 \end{cases}$$

$\int_0^{0.1} F(x)\,dx \approx 0.1107936$

$\int_0^{0.1} e^{2x}\,dx = 0.1107014$

$E_r = \frac{\left|\int_0^{0.1} F(x)dx - \int_0^{0.1} e^{2x}dx\right|}{\int_0^{0.1} e^{2x}dx} = 0.08\%$