2.1

2) $g(t) = 2t^3 - 4t + 1 \qquad [0, 2]$

$g(0) = 2(0)^3 - 4(0) + 1 = 1$

$g(2) = 2(2)^3 - 4(2) + 1 = 16 - 8 + 1 = 9$

$$\frac{g(2) - g(0)}{(2) - (0)} = \frac{(9) - (1)}{(2) - (0)} = \frac{8}{2} = \underline{\underline{4}}$$

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4) $C(x) = \frac{4x}{x+2} \qquad [4, 8]$

$C(4) = \frac{4(4)}{(4)+2} = \frac{16}{6} = \frac{8}{3} \qquad C(8) = \frac{4(8)}{(8)+2} = \frac{32}{10} = \frac{16}{5}$

GLCD = 15 = (5)(3)

$$\frac{C(8) - C(4)}{(8) - (4)} = \frac{\left(\frac{16}{5}\right) - \left(\frac{8}{3}\right)}{(8) - (4)} = \left(\frac{\frac{16}{5} - \frac{8}{3}}{\frac{4}{1}}\right)\left(\frac{\frac{15}{1}}{\frac{15}{1}}\right) = \frac{(16)(3) - (8)(5)}{4(15)}$$

$$= \frac{48 - 40}{60} = \frac{8}{60} = \frac{4}{30} = \underline{\underline{\frac{2}{15}}}$$

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10) let t be amount of days

a) March 1 $\Rightarrow t = 0$, June 6 $\Rightarrow t = 97$

$$\frac{(225) - (174)}{(97) - (0)} = \frac{51}{97} \qquad \frac{51}{97} \text{ H5N1 cases per day}$$

b) April 3 $\Rightarrow t = 0$, May 4 $\Rightarrow t = 31$

$$\frac{(206) - (190)}{(31) - (0)} = \frac{16}{31} \qquad \frac{16}{31} \text{ H5N1 cases per day}$$

12) $\frac{(4.12)-(3.75)}{(6.3)-(5.1)} = \frac{0.37}{1.2} = \frac{3.7}{12}$

$\frac{3.7}{12}$ thousand of dollars per 1000 chips or $\frac{3.7}{12}$ dollars per chip

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18) a) $g(20) \approx 300$, $g(60) \approx 700$

$\frac{g(60)-g(20)}{(60)-(20)} = \frac{(700)-(300)}{(60)-(20)} = \frac{400}{40} = \underline{\underline{10}}$

b) $g(10) = 400$, $g(50) = 400$ $\quad \underline{\underline{[10, 50]}}$

c) $g(40) = 200$, $g(60) \approx 700$, $g(70) \approx 900$

$\frac{g(60)-g(40)}{(60)-(40)} = \frac{(700)-(200)}{(60)-(40)} = \frac{500}{20} = \frac{50}{2} = 25 = \left(\frac{50}{2}\right)\left(\frac{3}{3}\right) = \frac{150}{6}$

$\frac{g(70)-g(40)}{(70)-(40)} = \frac{(900)-(200)}{(70)-(40)} = \frac{700}{30} = \frac{70}{3} = \left(\frac{70}{3}\right)\left(\frac{2}{2}\right) = \frac{140}{6}$

[40, 60] gives a larger rate of change

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22) $h(t) = 58t - 0.83t^2$

a) $h(1) = 58(1) - 0.83(1)^2 = 58 - 0.83 = 57.17$

$h(2) = 58(2) - 0.83(2)^2 = 116 - 0.83(4) = 116 - 3.32 = 112.68$

$h(1.5) = 58(1.5) - 0.83(1.5)^2 = 87 - 0.83(2.25) = 87 - 1.8675 = 85.1325$

22 continued

$$h(1.1) = 58(1.1) - 0.83(1.1)^2 = 63.8 - 0.83(1.21) = 63.8 - 1.0043 = 62.7957$$

$$h(1.01) = 58(1.01) - 0.83(1.01)^2 = 58.58 - 0.83(1.0201) = 58.58 - 0.846683$$
$$= 57.733317$$

$$h(1.001) = 58(1.001) - 0.83(1.001)^2 = 58.058 - 0.83(1.002001)$$
$$= 58.058 - 0.83166083 = 57.22633917$$

i) $\dfrac{h(2)-h(1)}{(2)-(1)} = \dfrac{(112.68)-(57.17)}{(2)-(1)} = \dfrac{55.51}{1} = \underline{\underline{55.51}}$

ii) $\dfrac{h(1.5)-h(1)}{(1.5)-(1)} = \dfrac{(85.1325)-(57.17)}{(1.5)-(1)} = \dfrac{27.9625}{0.5} = \dfrac{279.625}{5} = \underline{\underline{55.925}}$

iii) $\dfrac{h(1.1)-h(1)}{(1.1)-(1)} = \dfrac{(62.7957)-(57.17)}{(1.1)-(1)} = \dfrac{5.6257}{0.1} = \dfrac{56.257}{1} = \underline{\underline{56.257}}$

iv) $\dfrac{h(1.01)-h(1)}{(1.01)-(1)} = \dfrac{(57.733317)-(57.17)}{(1.01)-(1)} = \dfrac{0.563317}{0.01} = \dfrac{56.3317}{1} = \underline{\underline{56.3317}}$

v) $\dfrac{h(1.001)-h(1)}{(1.001)-(1)} = \dfrac{(57.22633917)-(57.17)}{(1.001)-(1)} = \dfrac{0.05633917}{0.001} = \dfrac{56.33917}{1} = \underline{\underline{56.33917}}$

b) the speed estimated when $t = 1$ is $\underline{\underline{56.34 \text{ m/sec}}}$