Assignment 2 (SOLUTION from Textbook Manual Solution)

***Text:** Calculus for the Life Sciences, S. Schreiber, K. Smith and W. Getz, Wiley, 2014*

Section 2.1

10. By definition, the instantaneous rate of change at this point is

$$\lim_{b\to 4}\frac{f(b)-f(4)}{b-4}=\lim_{b\to 4}\frac{-2b^2+b+4-(-24)}{b-4}=\lim_{b\to 4}\frac{-2(b^2-16)+(b-4)}{b-4}=$$

$$=\lim_{b\to 4}-2(b+4)+1=-15.$$

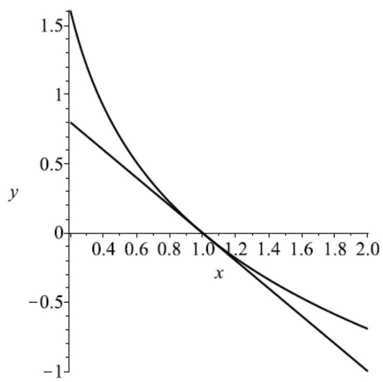
12. By definition, the instantaneous rate of change at this point is

$$\lim_{b\to 1}\frac{f(b)-f(1)}{b-1}=\lim_{b\to 1}\frac{-2/(b+1)-(-1)}{b-1}=\lim_{b\to 1}\frac{-2/(b+1)+(b+1)/(b+1)}{b-1}=$$

$$=\lim_{b\to 1}\frac{b-1}{(b+1)(b-1)}=\lim_{b\to 1}\frac{1}{b+1}=\frac{1}{2}.$$

22. An estimate of the slope is -2.

34. An estimate of the slope is -1.



44. On $[56, 75]$, the average rate of change is $(20.15(75)^{2/3} - 20.15(56)^{2/3})/19 \approx 3.33$ kilograms lifted per kilograms of weight, on $[100, 110]$, the average rate of change is $(20.15(110)^{2/3} - 20.15(100)^{2/3})/10 \approx 2.85$

48. At $x = 56$, 3.5 kilograms lifted per kilograms of weight, at $x = 100$, 2.9 kilograms lifted per kilograms of weight.

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52. The instantaneous rate of change at $t = 5$ is $\lim_{h\to 0}(84+61(5+h)+3(5+h)^2-(84+61\cdot 5+3\cdot 5^2))/h = \lim_{h\to 0}(61+30+3h) = 91$ thousand bacteria per hour.

Section 2.2

6. a. As x gets closer to -1 from below, the value of the function gets closer to 2; $\lim_{x\to -1^-} F(x) = 2$.

b. As x gets closer to -1 from above, the value of the function gets closer to 2; $\lim_{x\to -1^+} F(x) = 2$.

c. According to parts **a** and **b** above, $\lim_{x\to -1} F(x) = 2$.

12. The figure shows that $\lim_{x\to 3^+} h(x) = 2$.

14.

x	1	1.5	1.9	1.99	1.999	1.9999
$g(x)$	-1	-0.5	-0.1	-0.01	-0.001	-0.0001

; we obtain $\lim_{x\to 2^-} \frac{x^3-8}{x^2+2x+4} = 0$.