Assignment 4 (SOLUTION from Textbook Manual Solution)

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

Section 2.4

12. $\lim_{x\to-\infty} \frac{x^3}{1+x^3} = \lim_{x\to-\infty} \frac{1}{(1/x^3)+1} = 1.$

13. Division gives $\lim_{x\to\infty} \frac{(2x+5)(x-2)}{(7x-2)(3x+1)} = \lim_{x\to\infty} \frac{(2+5/x)(1-2/x)}{(7-2/x)(3+1/x)} = 2/21.$

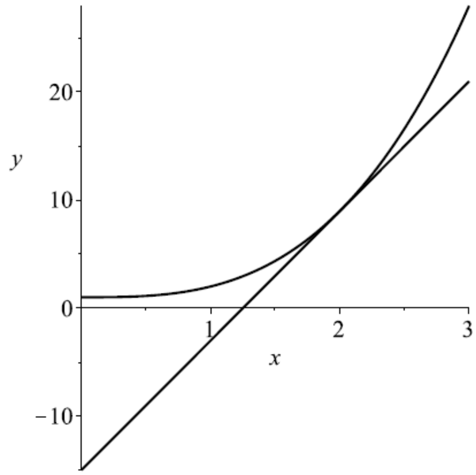
21. We compute: $\lim_{x\to\infty} \sqrt{x+1} - \sqrt{x} = \lim_{x\to\infty} \frac{(\sqrt{x+1}-\sqrt{x})(\sqrt{x+1}+\sqrt{x})}{\sqrt{x+1}+\sqrt{x}} = \lim_{x\to\infty} \frac{1}{\sqrt{x+1}+\sqrt{x}} = 0.$

22. $\lim_{x\to\infty} x - \sqrt{x} = \lim_{x\to\infty} \sqrt{x}(\sqrt{x}-1) = \infty,$ since both terms in this product grow without bound.

Section 2.6

9. We compute: $f'(9) = \lim_{h\to 0} \frac{f(9+h)-f(9)}{h} = \lim_{h\to 0} \frac{\sqrt{9+h}-\sqrt{9}}{h} =$
$= \lim_{h\to 0} \frac{(\sqrt{9+h}-3)(\sqrt{9+h}+3)}{h(\sqrt{9+h}+3)} = \lim_{h\to 0} \frac{9+h-9}{h(\sqrt{9+h}+3)} = \lim_{h\to 0} \frac{1}{(\sqrt{9+h}+3)} = \frac{1}{6}.$

18. The tangent line is given by $y - f(a) = f'(a)(x-a)$, thus using Problem 8, the answer is $y - 9 = 12(x-2)$, i.e. $y = 12x - 15$.



Assignment 4 (SOLUTION from Textbook Manual Solution)

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

21. At $x = 0$; the limit of the difference quotients is -1 from the left side and 1 from the right side.

35. a. $P'(40) = \lim_{h\to 0} \frac{P(40+h) - P(40)}{h} = \lim_{h\to 0} \frac{9.2h + 0.5h^2}{h} = 9.2.$

b. $P'(45) = \lim_{h\to 0} \frac{P(45+h) - P(45)}{h} =$

$\lim_{h\to 0} \frac{14.2h + 0.5h^2}{h} = 14.2.$

c. The increase in the prevalence of MS is speeding up as the latitude is increasing.

Section 2.7

12. $\left.\frac{dy}{dx}\right|_{x=4} = 1 + 2(4) = 9$ from Problem 4.

16. $\left.\frac{dy}{dx}\right|_{x=10} = -1/2(10)^2 = -1/200$ from Problem 8.