Chapter 3 Solutions
MATH 251, CALCULUS I, FALL 2018

Section 3.3

1. $f'(x) = x^2 \cos x + 2x \sin x$
2. $f'(x) = cosx - x \sin x + 2 \sec^2 x$
5. $y' = \sec\theta(\sec^2\theta + \tan^2\theta$
9. $y' = \dfrac{2 - \tan x + x \sec^2 x}{(2 - \tan x)^2}$
15. $f'(\theta) = \cos(\theta)\sin(\theta) - \theta \sin^2\theta + \theta \cos^2\theta$
16. $f'(t) = e^t(\cot t + t \cot t - t \csc^2 t$
19. $-\csc^2 x$
22. $y = x + 1.$
32. (a) $2 - \sqrt{3}$ (b) $\dfrac{1 - 2\sqrt{3}}{16}$
33. We need x such that $\cos x = -\frac{1}{2}$ so $x = \dfrac{2\pi}{3} + 2\pi n.$
37. $5ft/rad.$
53. $A = -\frac{3}{10}$ $B = -\frac{1}{10}.$

Section 3.4

2. $\dfrac{4}{3\sqrt[3]{(1+4x)^2}}$
7. $F'(x) = 4(5x^6 + 2x^3)^3(30x^5 + 6x^2).$
15. $f'(t) = e^{bt}(b \cos bt + a \sin bt$
17. $f'(x) = (2x-3)^4 \cdot 5(x^2+x+1)^4(2x+1) + (x^2+x+1)^5 \cdot 4(2x-3)^3 \cdot 2$
22. $y' = 5\left(x + \dfrac{1}{x}\right)^4\left(1 - \dfrac{1}{x^2}\right)$
23. $y' = (\sec^2\theta e^{\tan\theta}$
27. $r'(t) = \frac{\ln(10)10^{2\sqrt{t}}}{\sqrt{t}}$
35. $y' = -\sin\left(\frac{1-e^{2x}}{1+e^{2x}}\right) \cdot \frac{(1+e^{2x})(-2e^{2x}) - (1-e^{2x})(2e^{2x})}{(1+e^{2x})^2}$

36. $y' = e^{-1/x}(1 + 2x)$

40. $y' = 2\cos 2x e^{\sin 2x} + 2e^{2x}\cos\left(e^{2x}\right)$

47. $y' = -\sin\sin(3\theta)\cdot(\cos 3\theta\cdot 3 \quad y'' = -3[(\cos(3\theta)\cos\sin(3\theta)(\cos(3\theta)\cdot 3 + \sin(\sin(3\theta)(-\sin(3\theta)\cdot 3]$

54. $y = x$.

63. (a) 30 (b) 36

79. $\frac{5\pi}{2}\cos(10\pi t)$ cm/s.