Sec 3.3

#26. $f'(v) = 100v^{99} + e^v$

#28. $g'(t) = 6 \cdot \frac{1}{2\sqrt{t}} = \frac{3}{\sqrt{t}}$

#46. $f(x) = x - 1$ so $f'(x) = 1$.

#70. $f'(x) = 6x + 5e^x$; $f''(x) = 6 + 5e^x$; $f'''(x) = 5e^x$.

Sec 3.4

#21. $f'(x) = \frac{(x+1)\cdot 1 - x \cdot 1}{(x+1)^2} = \frac{1}{(x+1)^2}$

#23. $f'(t) = \frac{5}{3}t^{2/3}e^t + t^{5/3}e^t = t^{2/3}\left(\frac{5}{3} + t\right)e^t$

#28. $f(x) = e^x x^{1/3}$; $f'(x) = e^x x^{1/3} + e^x \cdot \frac{1}{3}x^{-2/3} = \frac{1}{3}e^x x^{-2/3}(1 + 3x)$

#29. $y = \frac{3t-1}{2t-2}$; $\frac{dy}{dt} = \frac{(2t-2)\cdot 3 - (3t-1)\cdot 2}{(2t-2)^2} = \frac{8}{(2t-2)^2} = \frac{2}{(t-1)^2}$.

#34. $s'(t) = \frac{e^t \cdot \frac{4}{3}t^{1/3} - e^t \cdot t^{4/3}}{(e^t)^2} = \frac{(4-3t)t^{1/3}e^t}{3e^{2t}} = \frac{(4-3t)t^{1/3}}{3e^t}$

#35. $f'(t) = e^t(t^2 - 2t + 2) + e^t(2t - 2) = t^2e^t$

#76. $(fg)'(1) = f'(1)g(1) + f(1)g'(1) = 3 \cdot 4 + 5 \cdot 2 = 22$

#77. $\left(\frac{f}{g}\right)'(2) = \frac{g(2)f'(2) - f(2)g'(2)}{g(2)^2} = \frac{2 \cdot 5 - 4 \cdot 4}{4} = \frac{-6}{4} = -\frac{3}{2}$.

#78. $\left[1 \cdot f(x) + x f'(x)\right]_{x=3} = f(3) + 3f'(3) = 3 + 3 \cdot 2 = 9$

#79. $\left.\frac{(x+2)f'(x) - 1 \cdot f(x)}{(x+2)^2}\right|_{x=4} = \frac{6f'(4) - f(4)}{36} = \frac{6 \cdot 1 - 2}{36} = \frac{1}{9}$

Sec 3.5

#12. $\lim_{x\to 0} \frac{\sin 5x}{3x} = \lim_{u\to 0} \frac{5}{3} \cdot \frac{\sin u}{u} = \frac{5}{3} \cdot 1 = \frac{5}{3}$ (substitute $u = 5x$).

#25. $\frac{dy}{dx} = -e^{-x}\sin x + e^{-x}\cos x = e^{-x}(\cos x - \sin x)$

#34. $\frac{dy}{dx} = \frac{(1+\cos x)(\sin x + x\cos x) - (-\sin x)\, x \sin x}{(1+\cos x)^2}$

#38. $\frac{dy}{dx} = \frac{(2+\sin x)\cdot 0 - (\cos x)\cdot 1}{(2+\sin x)^2} = \frac{-\cos x}{(2+\sin x)^2}$

#42. $\frac{dy}{dx} = \sec^2 x - \csc^2 x$

#44. $\frac{dy}{dx} = (\sec x \tan x)\tan x + \sec x(\sec^2 x) = \sec x \tan^2 x + \sec^3 x$

$= \sec x(\sec^2 x + \tan^2 x)$.

[Note: Using $\sec^2 x = 1 + \tan^2 x$, we can farther simplify to obtain $\frac{dy}{dx} = 2\sec^3 x - \sec x$; but you shouldn't worry too much about this.]

#47. $\frac{dy}{dx} = \frac{(1+\csc x)(-\csc^2 x) - (-\csc x \cot x)\cot x}{(1+\csc x)^2}$

#60. $y' = \frac{1}{2}e^x \cos x + \frac{1}{2}e^x(-\sin x) = \frac{1}{2}e^x(\cos x - \sin x)$

$y'' = \frac{1}{2}e^x(\cos x - \sin x) + \frac{1}{2}e^x(-\sin x - \cos x) = -e^x \sin x$