Sec 3.4 day 3 page 205 (8–28 even, 51, 52, 55)

(8) $F(x) = (4x - x^2)^{100}$

$f = u^{100}$ $\quad u = 4x - x^2$

$f' = 100u^{99}$ $\quad u' = 4 - 2x$

$F'(x) = \boxed{(400 - 200x)(4x - x^2)^{99}}$

(10) $f(x) = (1 + x^4)^{2/3}$

$f = u^{2/3}$ $\quad u = 1 + x^4$

$f' = \dfrac{2}{3\sqrt[3]{u}}$ $\quad u' = 4x^3$

$\boxed{f'(x) = \dfrac{8x^3}{3\sqrt[3]{1+x^4}}}$

(12) $f(t) = \sqrt[3]{1 + \tan t}$

$f = u^{1/3}$ $\quad u = 1 + \tan t$

$f' = \frac{1}{3}u^{-2/3}$ $\quad u' = \sec^2 t$

$\boxed{f'(t) = \dfrac{\sec^2 t}{3\sqrt[3]{(1+\tan t)^2}}}$

(14) $y = a^3 + \cos^3 x$

$f = u^3$ $\quad u = \cos x$

$f' = 3u^2$ $\quad u' = -\sin x$

$\boxed{y' = -3\cos^2 x \sin x}$

(16) $y = 3\cot(n\theta)$

$f = 3\cot u$ $\quad u = n\theta$

$f' = 3\csc^2 u$ $\quad u' = n$

$\boxed{y' = -3n\csc^2(n\theta)}$

(18) $y = e^{-2t}\cos 4t$

$f = e^{-2t}$ $\quad g = \cos 4t$

$f' = -2e^{-2t}$ $\quad g' = -4\sin 4t$

$y' = -2e^{-2t}\cos 4t - 4e^{-2t}\sin 4t = \boxed{-2e^{-2t}(\cos 4t + 2\sin 4t)}$

(20) $h(t) = (t^4-1)^3(t^3+1)^4$

$f = (t^4-1)^3 \qquad g = (t^3+1)^4$

$f' = 3(t^4-1)^2(4t^3) \qquad g' = 4(t^3+1)^3(3t^2)$

$h'(t) = 12t^3(t^4-1)^2(t^3+1)^4 + 12t^2(t^3+1)^3(t^4-1)^3$

$h'(t) = 12t^2(t^4-1)^2(t^3+1)^3(t(t^3+1) + t^4-1)$

$\boxed{= 12t^2(t^4-1)^2(t^3+1)^3(2t^4+t-1)}$

(22) $y = 10^{1-x^2}$

$f = 10^u \qquad u = 1-x^2$

$f' = 10^u \ln 10 \qquad u' = -2x$

$\boxed{y' = -2x(10^{1-x^2}\ln 10)}$

(24) $G(y) = \left(\dfrac{y^2}{y+1}\right)^5$

$f = u^5 \qquad u = \dfrac{y^2}{y+1}$

$f' = 5u^4$

$u' = \dfrac{2y(y+1) - y^2}{(y+1)^2} = \dfrac{2y^2+2y-y^2}{(y+1)^2} = \dfrac{y^2+2y}{(y+1)^2}$

$G'(y) = 5\left(\dfrac{y^2}{y+1}\right)^4\left(\dfrac{y^2+2y}{(y+1)^2}\right) = \dfrac{5y^8(y^2+2y)}{(y+1)^6}$

$\boxed{= \dfrac{5y^{10}+10y^9}{(y+1)^6}}$

(26) $y = \dfrac{e^4 - e^{-4}}{e^4 + e^{-4}}$

$e^u \quad u = -u$

$e^u \quad u' = -1$

$f = e^4 - e^{-u} \qquad g = e^4 + e^{-u}$

$f' = e^4 + e^{-u} \qquad g' = e^4 - e^{-u}$

$$\boxed{y' = \frac{(e^4 + e^{-4})^2 - (e^4 - e^{-4})^2}{(e^4 + e^{-4})^2}}$$

(28) $y = e^{k\tan\sqrt{x}}$

$f = e^u \qquad u = k\tan\sqrt{x} \qquad \tan u \quad u = \sqrt{x}$

$f' = e^4 \qquad u' = k\cdot\sec^2\sqrt{x} \qquad \sec^2 u \quad \frac{1}{2\sqrt{x}}$

$$\boxed{y' = e^{k\tan\sqrt{x}}\left(\frac{k\sec^2\sqrt{x}}{2\sqrt{x}}\right)}$$

(51) $f(g(x)) = f'(g(5))(g'(5))$

$= f'(-2)(g'(5))$

$= 4(6) \boxed{= 24}$

(52) $h(x) = \sqrt{4 + 3f(x)}$

$f = u^{1/2} \qquad g = 4 + 3(7)$

$f' = \frac{1}{2}(4+21)^{-1/2} \qquad g' = 3f'(x) = 3(4) = 12$

$h'(x) = \dfrac{(12)}{2\sqrt{25}} = \dfrac{6}{5}$

(55) a) $u' = \ 1))\, g'(1)$

$= f\ g'(1)$

$= -\frac{3}{4}) = \frac{3}{4}$

b) $v' = (1))(f'(1))$

$= (\ )(f'(1))$

$=$ ined so v' does not exist

c) $w'(1\ (g(x))\, g'(x)$

$(3))(g'(1))$

$= \left(\frac{-3}{1}\right) = 2$