

MORE PRACTICE!!

Work on p121 18-22, 26, 28, 30, 41, 42

$$9) y = \underbrace{(t^3 - 7t^2 + 1)}_{1st} \underbrace{e^t}_{2nd}$$

$$y' = (t^3 - 7t^2 + 1) e^t + e^t (3t^2 - 14t)$$

$$y' = e^t (t^3 - 4t^2 - 14t + 1)$$

$$20) y = \frac{\sqrt{t}}{t^2+1} = \frac{t^{1/2}}{t^2+1}$$

$$y' = \frac{(t^2+1)^{1/2} t^{-1/2} - t^{1/2} (2t)}{(t^2+1)^2} = \frac{\left(\frac{t^2+1}{2\sqrt{t}} - \frac{2t\sqrt{t}}{1} \right) 2\sqrt{t}}{(t^2+1)^2 \cdot 2\sqrt{t}}$$

$$= \frac{(t^2+1) - 4t^2}{2\sqrt{t} (t^2+1)^2}$$

$$= \frac{-3t^2+1}{2\sqrt{t} (t^2+1)^2}$$

$$\frac{1}{b^n} = b^{-n}$$

$$21) f(z) = \frac{z^2+1}{\sqrt{z}} = \frac{z^2}{z^{1/2}} + \frac{1}{z^{1/2}} = z^{3/2} + z^{-1/2}$$

$$f'(z) = \frac{3}{2} z^{1/2} - \frac{1}{2} z^{-3/2}$$

$$= \frac{3\sqrt{z}}{2} - \frac{1}{2\sqrt{z^3}}$$

$$22) \quad g(t) = \frac{4}{3+\sqrt{t}} = \frac{4}{3+t^{1/2}}$$

$$g'(t) = \frac{(3+t^{1/2}) \cdot 0 - 4 \cdot \frac{1}{2} t^{-1/2}}{(3+t^{1/2})^2}$$

$$g'(t) = \frac{-2t^{-1/2}}{(3+t^{1/2})^2} = \frac{-\frac{2}{\sqrt{t}}}{(3+\sqrt{t})^2} \cdot \frac{\sqrt{t}}{\sqrt{t}} = \frac{-2}{\sqrt{t}(3+\sqrt{t})^2}$$

41)

x	f(x)	g(x)	f'(x)	g'(x)
2	3	4	5	-2

a) $h(x) = f(x) + g(x)$

$$h'(2) = f'(2) + g'(2) = 5 + (-2) = 3$$

b) $h(x) = f(x) \cdot g(x)$

$$\begin{aligned} h'(2) &= f(2) \cdot g'(2) + g(2) \cdot f'(2) \\ &= 3 \cdot (-2) + 4 \cdot 5 \\ &= -6 + 20 \\ &= 14 \end{aligned}$$

c) $h(x) = \frac{f(x)}{g(x)}$

$$h'(2) = \frac{g(2) \cdot f'(2) - f(2) \cdot g'(2)}{(g(2))^2}$$

$$= \frac{4 \cdot 5 - 3 \cdot (-2)}{4^2}$$

$$= \frac{26}{16} = \frac{13}{8}$$

14) $g(t) = \frac{t-4}{t+4}$

$$g'(t) = \frac{(t+4) \cdot 1 - (t-4) \cdot 1}{(t+4)^2}$$

$$g'(t) = \frac{\cancel{t+4} - \cancel{t+4}}{(t+4)^2} = \frac{8}{(t+4)^2}$$

$$27) f(x) = \frac{1+x}{2+3x+4x^2}$$

$$f'(x) = \frac{(2+3x+4x^2) \cdot 1 - (1+x)(3+8x)}{(2+3x+4x^2)^2}$$

$$f'(x) = \frac{2+3x+4x^2 - 3-11x-8x^2}{(2+3x+4x^2)^2}$$

$$f'(x) = \frac{-4x^2 - 8x - 1}{(2+3x+4x^2)^2}$$

$$29) w = (t^3 + 5t)(t^2 - 7t + 2)$$

$$w = t^5 - 7t^4 + 2t^3 + 5t^3 - 35t^2 + 10t$$

$$w = t^5 - 7t^4 + 7t^3 - 35t^2 + 10t$$

$$w' = 5t^4 - 28t^3 + 21t^2 - 70t + 10$$

$$w' = (t^3 + 5t)(2t - 7) + (t^2 - 7t + 2)(3t^2 + 5)$$

$$w' = 2t^4 - 7t^3 + 10t^2 - 35t + 3t^4 - 21t^3 + 6t^2$$

$$+ 5t^2 - 35t + 10$$

$$5t^4 - 28t^3 + 21t^2 - 70t + 10$$

$$19) w = \frac{y^3 - 6y^2 + 7y}{y} = \frac{y^3}{y} - \frac{6y^2}{y} + \frac{7y}{y}$$

$$w = y^2 - 6y + 7$$

$$w' = 2y - 6$$

$$30) f(x) = (3x+8)(2x-5)$$

$$f(x) = 6x^2 + x - 40$$

$$f'(x) = 12x + 1$$

$$f''(x) = 12$$

$$28) f(x) = \frac{ax+b}{cx+k}$$

$$f'(x) = \frac{(cx+k)a - (ax+b)c}{(cx+k)^2}$$

$$f'(x) = \frac{\cancel{acx} + ak - \cancel{acx} - bc}{(cx+k)^2}$$

$$f'(x) = \frac{ak - bc}{(cx+k)^2}$$

$$f(x) = \frac{5x+1}{4x+7}$$

$$f'(x) = \frac{35-4}{(4x+7)^2} = \frac{31}{(4x+7)^2}$$

$$\frac{(4x+7)5 - (5x+1)4}{(4x+7)^2}$$

$$\frac{\cancel{20x} + 35 - \cancel{20x} - 4}{(4x+7)^2}$$