5.4 Practice

Pg 376 Hmwk (1, 5, 9, 13, 21, 29, 30) all circled

1. $f(x) = e^{3x}$
$f'(x) = 3e^{3x}$

2. $f(x) = 3e^{x}$
$f'(x) = 3e^{x}$

3. $g(t) = e^{-t}$
$g'(t) = -e^{-t}$

4. $f(x) = e^{-2x}$
$f'(x) = -2e^{-2x}$

5. $f(x) = e^{x} + x^{2}$
$f'(x) = e^{x} + 2x$

6. $f(x) = 2e^{x} - x^{2}$
$f'(x) = 2e^{x} - 2x = 2(e^{x} - x)$

7. $f(x) = x^{3}e^{x}$
$f'(x) = x^{3}e^{x} + 3e^{x}x^{2} = x^{2}e^{x}(x+3)$

8. $f(u) = u^{2}e^{-u}$
$f'(u) = -u^{2}e^{-u} + 2ue^{-u} = ue^{-u}(2-u)$

9. $f(x) = \frac{e^{x}}{x}$
$f'(x) = e^{x}x^{-1}$
$f'(x) = -1e^{x}x^{-2} + x^{-1}e^{x}$
$f'(x) = \frac{e^{x}}{x} - \frac{e^{x}}{x^{2}}$
$f'(x) = \frac{xe^{x} - e^{x}}{x^{2}}$
$f'(x) = \frac{e^{x}(x-1)}{x^{2}}$

10. $f(x) = \frac{x}{e^{x}}$
$f(x) = xe^{-x}$
$f'(x) = -xe^{-x} + e^{-x}(1)$
$f'(x) = e^{-x}(1-x)$
$f'(x) = \frac{(1-x)}{e^{x}}$

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11. $f(x) = 3(e^x + e^{-x})$

$f'(x) = 3[e^x - e^{-x}] = 3\left[e^x - \frac{1}{e^x}\right]$

$f'(x) = 3\left[\frac{e^{2x} - 1}{e^x}\right]$

12. $f(x) = \frac{e^x + e^{-x}}{2}$

$f'(x) = \frac{2[e^x - e^{-x}]}{4} = \boxed{\frac{e^x - e^{-x}}{2}}$ Textbook answer OR $= \frac{e^x}{2} - \frac{1}{2e^x} = \boxed{\frac{e^{2x} - 1}{2e^x}}$ would except

13. $f(w) = \frac{e^w + 2}{e^w}$

$f'(w) = \frac{e^w(e^w) - (e^w + 2)e^w}{e^{2w}} = \frac{e^{2w} - e^{2w} - 2e^w}{e^{2w}}$

$= -\frac{2e^w}{e^{2w}} = \boxed{\frac{-2}{e^w}}$

14. $f(x) = \frac{e^x}{e^x + 1}$

$f'(x) = \frac{(e^x + 1)(e^x) - e^x(e^x)}{(e^x + 1)^2} = \frac{e^{2x} + e^x - e^{2x}}{(e^x + 1)^2} = \boxed{\frac{e^x}{(e^x + 1)^2}}$

? 15. $f(x) = 2e^{3x-1}$

$f'(x) = 2(3)e^{3x-1} = \boxed{6e^{3x-1}}$

16. $f(t) = 4e^{3t+2} = 4(3)e^{3t+2} = \boxed{12e^{3t+2}}$

28. $g(t) = \frac{e^{-t}}{1+t^2}$ $g'(t) = \frac{(1+t^2)(-e^{-t}) - e^{-t}(2t)}{(1+t^2)^2}$

Next Pg. $g'(t) = [-e^{-t} - t^2e^{-t} - 2te^{-t}]/(1+t^2)^2 =$

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26. $f(s) = (s^2+1)e^{-s^2}$

$$f'(s) = (s^2+1)(-2se^{-s^2}) + e^{-s^2}(2s)$$

$$= -2s^3e^{-s^2} - 2se^{-s^2} + 2se^{-s^2}$$

$$= \boxed{-2s^3e^{-s^2}}$$

27. $f(x) = \dfrac{(e^x-1)}{(e^x+1)}$

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

$$\boxed{f'(x) = \frac{2e^x}{(e^x+1)^2}}$$

Textbook answer ↓

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

$$= \boxed{\frac{-(t+1)^2}{e^t(t^2+1)^2}}$$

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21. $f(x) = (e^x + 1)^{-25}$

$f'(x) = 25(e^x+1)^{24}(e^x) = \boxed{25e^x(e^x+1)^{24}}$

Find $f''(x)$ for both 29 & 30

29. $f(x) = e^{-4x} + e^{3x}$

$f'(x) = e^{-4x}(-4) + e^{3x}(3)$

$f'(x) = -4e^{-4x} + 3e^{3x}$

Note: I used the product rule

$f''(x) = -4e^{-4x}(-4) + e^{-4x}(0) + 3e^{3x}(3) + e^{3x}(0)$

$\boxed{f''(x) = 16e^{-4x} + 9e^{3x}}$

30. $f(t) = 3e^{-2t} - 5e^{-t}$

$f'(t) = 3e^{-2t}(-2) - 5e^{-t}(-1) = -6e^{-2t} + 5e^{-t}$

$f''(t) = -6e^{-2t}(-2) + 5e^{-t}(-1)$

$\boxed{f''(t) = 12e^{-2t} - 5e^{-t}}$