

6.1 Practice Hmwk (1, 9, 11, 13, 19, 27, 39)

$$1. F'(x) = x^2 + 4x - 1 = f(x)$$

$$2. F'(x) = xe^x(1) + e^x(1) = e^x(x+1) = f(x)$$

$$3. F'(x) = (2x^2 - 1)^{1/2}$$

$$F'(x) = \frac{1}{2} (2x^2 - 1)^{-1/2} (4x) = \frac{2x}{\sqrt{2x^2 - 1}} = f(x)$$

$$4. F(x) = x \ln x - x$$

$$F'(x) = x \left(\frac{1}{x} \right) + \ln x (1) - 1$$

$$F'(x) = \ln x = f(x)$$

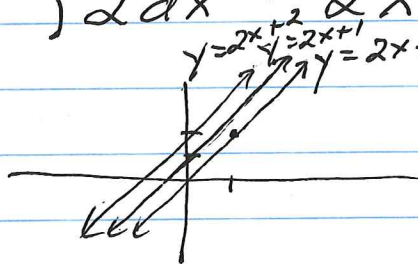
$$5. G(x) = 2x$$

$$a) G'(x) = 2 = f(x)$$

$$b) f(x) = 2$$

$$\int 2 dx = 2x + C$$

c)



6.1 Practice (cont.)

$$(9.) \int 6 dx = 6x + C$$

$$10. \int \sqrt{2} dx = \sqrt{2} x + C$$

$$(11.) \int x^3 dx = \frac{1}{4} x^4 + C$$

$$12. \int 2x^5 dx = \frac{2}{6} x^6 + C = \frac{1}{3} x^6 + C$$

$$(13.) \int x^{-4} dx = -\frac{1}{3} x^{-3} + C = -\frac{1}{3x^3} + C$$

$$14. \int 3t^{-7} dt = 3 \int t^{-7} dt = 3 \left(\frac{1}{-6} t^{-6} \right) + C = \boxed{-\frac{1}{2t^6} + C}$$

$$15. \int x^{2/3} dx = \frac{1}{(\frac{2}{3}+1)} x^{\frac{2}{3}+1} = \boxed{\frac{3}{5} x^{5/3} + C} \text{ OR } \frac{3}{5} \sqrt[3]{x^5} + C$$

$$16. \int 2u^{3/4} du = 2 \int u^{3/4} du = 2 \left(\frac{1}{7/4} \right) u^{7/4} + C = \boxed{\frac{8}{7} u^{7/4} + C}$$

$$17. \int x^{-5/4} dx = \frac{1}{-\frac{5}{4} + \frac{4}{4}} x^{-1/4} + C = \boxed{-4x^{-1/4} + C}$$

$$(19.) \int \frac{2}{x^3} dx = 2 \int x^{-3} dx = 2 \left(\frac{1}{-3+1} \right) x^{-2} + C = \boxed{-\frac{1}{x^2} + C}$$

$$21. \int \pi t^{1/2} dt = \pi \int t^{1/2} dt = \pi \left(\frac{1}{\frac{1}{2} + \frac{1}{2}} \right) t^{3/2} + C = \boxed{\frac{2\pi}{3} t^{3/2} + C}$$

6.1 cont. practice

$$23. \int (3-4x) dx = \int 3 dx - \int 4x dx$$

$$= 3x - 4\left(\frac{1}{2}\right)x^2 + C = \boxed{-2x^2 + 3x + C}$$

$$25. \int x^2 dx + \int x dx + \int x^{-3} dx = \boxed{\frac{1}{3}x^3 + \frac{1}{2}x^2 - \frac{1}{2}x^{-2} + C}$$

$$(27.) \int 5e^x dx = 5 \int e^x dx = \boxed{5e^x + C}$$

$$29. \int 1 dx + \int x dx + \int e^x dx = \boxed{x + \frac{1}{2}x^2 + e^x + C}$$

$$31. \int 4x^3 dx - \int 2x^{-2} dx - \int 1 dx = \boxed{x^4 + \frac{2}{x} - x + C}$$

$$33. \int x^{5/2} dx + 2 \int x^{3/2} dx - \int x dx = \frac{2}{7}x^{7/2} + 2\left(\frac{2}{5}\right)x^{5/2} - \frac{1}{2}x^2 + C$$

$$= \boxed{\frac{2}{7}x^{7/2} + \frac{4}{5}x^{5/2} - \frac{1}{2}x^2 + C}$$

$$35. \int x^{1/2} dx + 2 \int x^{-1/2} dx$$

$$= \frac{2}{3}x^{3/2} + 2\left(\frac{1}{1/2}\right)x^{1/2} + C = \boxed{\frac{2}{3}x^{3/2} + 4x^{1/2} + C}$$

$$37. \int \left(\frac{u^3 + 2u^2 - 4}{3u}\right) du = \int \frac{1}{3}u^2 du + \frac{2}{3} \int u du - \frac{1}{3} \int \frac{1}{u} du$$

$$= \frac{1}{3}\left(\frac{1}{3}\right)u^3 + \frac{2}{3}\left(\frac{1}{2}\right)u^2 - \frac{1}{3} \ln|u| + C$$

$$= \boxed{\frac{1}{9}u^3 + \frac{1}{3}u^2 - \frac{1}{3} \ln|u| + C}$$

$$\text{OR} = \frac{(u^3 + 3u^2 - 3u \ln|u|)}{9} + C$$

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$$\begin{aligned}
 (39.) \int (2t+1)(t-2) dt &= \int (2t^2 - 3t - 2) dt \\
 &= 2\left(\frac{1}{3}\right)t^3 - 3\left(\frac{1}{2}\right)t^2 - 2t + C \\
 &= \boxed{\frac{2}{3}t^3 - \frac{3}{2}t^2 - 2t + C}
 \end{aligned}$$

$$\begin{aligned}
 41. \int (x^2 - 2 + x^{-2}) dx &= \frac{1}{3}x^3 - 2x - x^{-1} + C \\
 &= \boxed{\frac{1}{3}x^3 - 2x - \frac{1}{x} + C}
 \end{aligned}$$

$$\begin{aligned}
 43. \int (s+1)^2 dx &= \int (s^2 + 2s + 1) dx = \frac{1}{3}s^3 + s^2 + s + C \\
 &= \boxed{s\left(\frac{1}{3}s^2 + s + 1\right) + C}
 \end{aligned}$$

$$45. \int (e^t + t^e) dt = \int e^t dt + \int t^e dt = \boxed{e^t + \frac{1}{(e+1)} t^{(e+1)} + C}$$

$$47. \int (x+1 - x^{-1} + x^{-2}) dx = \boxed{\frac{1}{2}x^2 + x - \ln x - \frac{1}{x} + C}$$

$$49. \int \left(\frac{x - 2x^{1/2} + 1}{x^2}\right) dx = \int (x^{-1} - 2x^{-3/2} + x^{-2}) dx$$

$$\begin{aligned}
 &= \boxed{\ln x + 4x^{-1/2} - x^{-1} + C} \\
 \text{OR possibly} &= \boxed{\ln x + \frac{4}{\sqrt{x}} - \frac{1}{x} + C}
 \end{aligned}$$

6.1 (Cont.)

51. $f'(x) = 3x + 1$

$$\int f'(x) dx = \int (3x + 1) dx$$

$$f(x) = \frac{3}{2}x^2 + x + C \quad \text{given } f(1) = 3$$

$$f(1) = \frac{3}{2}(1)^2 + (1) + C = 3$$

$$\frac{5}{2} + C = 3$$

$$C = \frac{6}{2} - \frac{5}{2} = \frac{1}{2}$$

$$\text{So } f(x) = \boxed{\frac{3}{2}x^2 + x + \frac{1}{2}} = \text{OR } \boxed{\frac{3x^2 + 2x + 1}{2}}$$

53. $f'(x) = 3x^2 + 4x - 1$; $f(2) = 9$

$$\int f'(x) dx = \int (3x^2 + 4x - 1) dx$$

$$f(x) = x^3 + 2x^2 - x + C$$

$$f(2) = 2^3 + 2(2)^2 - (2) + C = 9$$

$$8 + 8 - 2 + C = 9$$

$$14 + C = 9$$

$$C = 9 - 14 = -5$$

$$f(x) = \boxed{x^3 + 2x^2 - x - 5}$$