For all problems, write the integral in terms of u and du. Then evaluate.

7. $\int (x-7)^3\,dx$, $u = x-7 \to \frac{du}{dx} = 1 \to du = dx$

So, $\int (u)^3\,du = \frac{u^4}{4} \to \boxed{\frac{(x-7)^4}{4} + c}$ ✓

8. $\int 2x\sqrt{x^2+1}\,dx$, $u = x^2+1 \to \frac{du}{dx} = 2x \to du = 2x\,dx \to dx = \frac{du}{2x}$

So, $\int 2x\sqrt{u}\,\frac{du}{2x} \to \int \sqrt{u}\,du = \frac{u^{3/2}}{3/2} = \frac{2u^{3/2}}{3} = \boxed{\frac{2(x^2+1)^{3/2}}{3} + c}$

9. $\int (x+1)^{-2}\,dx$, $u = x+1 \to \frac{du}{dx} = 1 \to du = dx$

So, $\int u^{-2}\,du = \frac{u^{-1}}{-1} = \frac{-1}{u} = \boxed{\frac{-1}{x+1} + c}$ ✓

11. $\int \sin(2x-4)\,dx$, $u = 2x-4 \to \frac{du}{dx} = 2 \to du = 2\cdot dx \to dx = \frac{du}{2}$

So, $\int \sin(u)\,\frac{du}{2} = \frac{\cos(u)}{2} = \boxed{\frac{\cos(2x-4)}{-2} + c}$

12. $\int \frac{x^3}{(x^4+1)^4}\,dx$; $u = x^4+1$ $\frac{du}{dx} = 4x^3 \to du = 4x^3\,dx \to dx = \frac{du}{4x^3}$

So, $\int x^3 \cdot (u)^{-4}\,\frac{du}{4x^3} = \frac{u^{-3}}{-3} \cdot \frac{1}{4} = \frac{1}{-12u^3} = \boxed{\frac{1}{-12(x^4+1)^3} + c}$ or $-12(x^4+1)^{-3} + c$

13. $\int \frac{x+1}{(x^2+2x)^3}\,dx$, $u = x^2+2x \to \frac{du}{dx} = 2x+2 \to du = 2x+2\cdot dx \to dx = \frac{du}{2(x+1)}$

So, $\int \frac{x+1}{u^3} \cdot \frac{du}{2(x+1)} \to \frac{u^{-2}}{-2} \cdot \frac{1}{2} = \frac{1}{-4(u^2)} = \boxed{\frac{1}{-4(x^2+2x)^2} + c}$ ✓

Calculus II Homework (cont.)

15. $\int \sqrt{4x-1}\,dx$, $u = 4x-1 \rightarrow \frac{du}{dx} = 4 \rightarrow du = 4 \cdot dx \rightarrow dx = \frac{du}{4}$

So, $\frac{1}{4}\int u^{1/2}\,du = \frac{u^{3/2}}{3/2} \cdot \frac{1}{4} = \frac{3u^{3/2}}{2} = \boxed{\frac{(4x-1)^{3/2}}{6} + C}$