(c)

$$\int 2x\sqrt{1+x^2}\,dx \Leftrightarrow \int 2x\cdot(1+x^2)^{\frac{1}{2}}\,dx =$$

* Let's say that:

$$u = 1+x^2 \qquad du = 2x\cdot dx$$
$$\frac{du}{dx} = 2x \qquad dx = \frac{du}{2x}$$

We get:

$$\int 2x\cdot(u)^{\frac{1}{2}}\,\frac{du}{2x} = 2x\cdot\frac{1}{2x}\int u^{\frac{1}{2}} =$$

$$= \frac{u^{\frac{1}{2}+1}}{\frac{1}{2}+1} = \frac{u^{\frac{3}{2}}}{\frac{3}{2}} = u^{\frac{3}{2}}\cdot\frac{2}{3} = \frac{u^{\frac{3}{2}}\cdot 2}{3} \Leftrightarrow$$

$$\Leftrightarrow \frac{(1+x^2)^{\frac{3}{2}}\cdot 2}{3} = \frac{1+x^3\cdot 2}{3} = \boxed{\frac{2+2x^3}{3}} + C$$

I think I followed the right steps, but I'm getting a wrong result.

↳ Right result: $\frac{2}{3}\left(\sqrt{1+x^2}\right)^3 + C$