2) $\int x \sqrt{x^2+1}\, dx$

$u = x^2 + 1 \qquad du = 2x\, dx$

$\qquad\qquad\qquad x\, dx = \frac{1}{2} du$

$\int x \sqrt{x^2+1}\, dx \rightarrow \int \sqrt{u} \cdot \frac{1}{2} du = \frac{1}{2} \int \sqrt{u}\, du$

$\int \sqrt{u}\, du = \frac{2}{3} u^{3/2} = \frac{1}{3} u^{2/3}$

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

3) $\int (5x^4 - 3x + 2)\, dx$

$\frac{1}{n+1} x^{n+1} + C$

$\boxed{x^5 - \frac{3}{2} x^2 + 2x + C}$

4) $\int_0^1 (3x^2 + 2x + 1)\, dx \rightarrow \int (3x^2 + 2x + 1)\, dx = x^3 + x^2 + x$

$\int 3x^2\, dx = x^3 \qquad\qquad 1^3 + 1^2 + 1 = 3$

$\int 2x\, dx = x^2 \qquad\qquad 0^3 + 0^2 + 0 = 0$

$\int 1\, dx = x \qquad\qquad \boxed{3}$

5) $\int_0^3 (3t^2 - 6t)dt$

$\int 3t^2 dt = t^3$

$\int -6t \, dt = -3t^2$

$[t^3 - 3t^2]_0^3$

$3^3 - 3 \cdot 3^2 = 0$

$0^3 - 3 \cdot 0^2 = 0$

$\boxed{0}$