For full credit, you must <u>show all work</u> and <u>circle</u> your final answer.

1 Use the fundamental theorem of calculus to find the derivative of the given function.

$$y = \int_0^{x^4} \cos^2(\theta)\, d\theta$$

$$y' = \cos^2(x^4) \cdot 4x^3$$

2 Find the general indefinite integral.

$$\int \sqrt{t}\,(t^2 + 3t + 2)\, dt$$

$$= \int t^{5/2} + 3t^{3/2} + 2t^{1/2}\, dt = \frac{2t^{7/2}}{7} + \frac{6}{5}t^{5/2} + \frac{4t^{3/2}}{3} + C$$

3 Use a substitution to evaluate the following indefinite integral.

$$\int \frac{z^2}{z^3+1}\, dz \qquad \text{Let} \quad u = z^3 + 1$$

$$du = 3z^2\, dz$$

$$= \frac{1}{3}\int \frac{1}{u}\, du$$

$$= \frac{1}{3}\ln|z^3 + 1| + C$$