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1. If $F(x)$ is an antiderivative of $f(x) = x^2 \cos(1 - x^2)$ with $F(0) = 3$, **a.** give an expression for $F(x)$, and **b.** find $\frac{d}{dx}F(\sin(x))$. (3 points)

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2. An astute calculus student invests P dollars in a bank in an account that accrues interest at a continuous rate of $r\%$ a year. Find an expression for the average amount in the student's account in the first T years. (4 points)

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3. Find exactly, using the Fundamental Theorem of Calculus: $\int_0^3 x(x^2 + 1)^{-1} \ln(x^2 + 1) dx$. (3 points)