MATH 2A/5A Prep: Composition of Functions

1. Let $f(x) = \cos(x)$, $g(x) = x^2 + \pi$. Find the functions $f(g(x))$ and $g(f(x))$, then find $f(g(0))$ and $g(f(0))$
2. Let $F(x) = e^{x^2}$. Write $F(x)$ as a composition of functions $f(x) = e^x$ and $g(x) = x^2$.
3. Let $F(x) = \sin^3(x^2)$. Write $F(x)$ as a composition of three functions.
4. Let $f(x) = x^2 - x + 4$. Simplify the expression $\dfrac{f(x+1) - f(x-1)}{2}$.