9. [15 points] The graph shows the area between the graphs of \( f(x) = 6 \cos(\sqrt{2}x) \) and \( g(x) = x^2 + x \). Let \((x_0, y_0)\) be the intersection point between the graphs of \( f(x) \) and \( g(x) \).

a. [6 points] Compute \( P(x) \), the function containing the first three nonzero terms of the Taylor series about \( x = 0 \) of \( f(x) = 6 \cos(\sqrt{2}x) \).

b. [3 points] Use \( P(x) \) to approximate the value of \( x_0 \).

c. [3 points] Use \( P(x) \) and the value of \( x_0 \) you computed in the previous question to write an integral that approximates the value of the shaded area. Find the value of this integral.

d. [1 point] Graph \( f(x) \) and \( g(x) \) in your calculator. Use the graphs to find an approximate value for \( x_0 \).

e. [2 points] Write a definite integral in terms of \( f(x) \) and \( g(x) \) that represents the value of the shaded area. Find its value using your calculator.