Problem 1 (9 points)

Find the linear approximations of \( f(x) \) at \( x_0 \):

a) \( f(x) = \sqrt{x} + \frac{1}{x}; \quad x_0 = 4 \)

b) \( f(x) = x^2 + \ln(x); \quad x_0 = e \)

c) \( f(x) = \sin(\pi); \quad x_0 = \frac{1}{2} \)

Problem 2 (6 points)

Compute the derivative of \( f(x) \):

a) \( f(x) = \sinh^{-1}(\sqrt{x}); \)

b) \( f(x) = \tanh^{-1}(x) \text{sech}(x^2); \)

\(^1\)The quiz lasts 30 minutes.