Math 150 Quizzes 4/5 Extra Problems (6 pts)

Please use your own paper, one side only.

1. Let \( y = \frac{\ln x}{x} \). Find \( y' \) and \( y'' \). Find critical points of \( y \). Evaluate \( y'' \) at the critical points and state the sign of \( y'' \) there.

2. Let \( f(x) = x - \sqrt{2} \cos x \) on \([ -\frac{\pi}{2}, \frac{\pi}{2} ] \). Find \( f'(x) \) and \( f''(x) \). Find any critical points in that interval and evaluate \( f'' \) there. State the sign of \( f'' \) at those points. Find the absolute extrema of \( f(x) \) on that interval.

3. Let \( ye^y = x \). Show that \( y' = \frac{y}{x e^y} \). Verify as well that \( y' = \frac{1}{x + e^y} \) and use this to find \( y'' \) in terms of \( x \) and \( y \).