1. Find the derivative of:

(a) \( e^{x \cos(x)} \cdot \sin(x) \)

(b) \( \frac{\cos^3(x) - \sin(x)}{e^{x^2} + x^2 \cdot 2^x} \)

(c) \( \frac{\cos^3(x) \cdot \sin(x)}{e^{x^2} \cdot x^2 \cdot 2^x} \)

(d) \( \cos(x)^{\sin(y)} = 0 \)

(e) \( \cos(xy) = x^2 y \)

(f) \( \tan(x)^{e^x} \)

(g) \( \arccos(x) \)

(h) \( \arctan(e^x) \)

(i) \( \sin(\arccos(x)) \)

2. Bob and Rachel compete in a 100-yard dash. After 5 seconds Bob was ahead, but Rachel won the race. Prove that at some point, Rachel’s velocity was the same as Bob’s.

3. A ball is tossed up in the air from a height of 5 feet, reaches some height, then falls back and hits the ground 6 seconds later. We don’t have enough information to compute the ball’s velocity (don’t know how much air resistance, terminal velocity of the ball, local density of the air, local gravitational strength...). But, you do know its exact velocity at two points during the trip (not counting the beginning or endpoint of the trip). What are those velocities?