Homework 2/24

For all of these problems, assume as fact that
\[ \lim_{h \to 0} \frac{e^h - 1}{h} = 1 \]

1. For \( f(x) = e^x \), find the following derivatives. Do each problem via secant slope, factor (as far as you can), and limit.

   (a) \( f'(0) \)
   (b) \( f'(5) \)
   (c) \( f'(-2) \)
   (d) \( f'(x) \)

2. For \( g(x) = e^{3x} \), compute the following. Do each problem via secant slope, factor (as far as you can) and limit.

   (a) \( g'(0) \)
   (b) \( g'(5) \)
   (c) \( g'(x) \)

3. For \( h(x) = x^2e^x \), compute the following. Do each problem via secant slope, factor (as far as you can) and limit.

   (a) \( h'(3) \)
   (b) \( h'(-2) \)
   (c) \( h'(x) \)

4. Find the slope of the tangent to \( y = 2e^x \) at \( x = 1 \).

5. Find where the slope of the curve \( y = 2e^x \) is 9.

Answers

1: a) 1; b) \( e^5 \); c) \( e^{-2} \); d) \( e^x \).
2: a) 3; b) \( 3e^{15} \); c) \( 3e^{3x} \).
3: a) \( 15e^3 \) b) 0; c) \( x^2e^x + 2xe^x \).
4: \( 2e \).
5: \ln 4.5.