1. Draw the first derivative of each function on the provided set of axes. All inflection points have been identified with dots.

Figure 1: $f$

Figure 3: $g$

Figure 4: $g'$

Figure 5: $h$

Figure 6: $h'$
2. Find the formula for \( f'(x) \) if \( f(x) = xe^{-x} \)

Hint: We haven’t yet covered the material necessary to take the derivative of \( e^{-x} \). How could you rewrite the formula for \( f \) to avoid this problem?

\[
\frac{d}{dx}(x) \cdot e^{-x} - x \cdot \frac{d}{dx}(e^{-x}) = \frac{e^{-x}(1-x)}{e^x}
\]

3. Find the formula for \( g'(x) \) if \( g(x) = \ln(x^2) \)

Hint: We haven’t yet covered the material necessary to take the derivative of \( \ln(x^2) \). How could you rewrite the formula for \( g \) to avoid this problem?

\[
g(x) = 2 \ln(x) \]
\[
g'(x) = \frac{2}{x}
\]

4. Find the formula for \( h'(x) \) if \( h(x) = x \sin^2(x) \)

Hint: We haven’t yet covered the material necessary to take the derivative of \( \sin^2(x) \). How could you rewrite the formula for \( h \) to avoid this problem?

\[
h(x) = x \sin(x) \sin(x)
\]
\[
h'(x) = \frac{d}{dx}(x) \sin(x) \sin(x) + x \frac{d}{dx}(\sin(x) \sin(x)) + x \sin(x) \frac{d}{dx}(\sin(x))
\]
\[
= (1) \sin(x) \cos(x) + x \cos(x) \sin(x) + x \sin(x) \cos(x)
\]
\[
= \sin(x) [\cos(x) + 2x \cos(x)]
\]

5. Use your calculator to draw graphs of the functions and derivatives stated and found on this page. Compare those graphs to the corresponding graphs on page 1.