

**Problem 1. Section 3.9 #332**

This is the quotient rule and exponential differentiation:  $f'(x) = \frac{x \frac{d}{dx} e^{-x} - e^{-x} \frac{d}{dx} x}{x^2} = \frac{-xe^{-x} - e^{-x}}{x^2}$ .

**Problem 2. Section 3.9 #336**

This is the constant multiple rule and equation 3.34 in the book:  $f'(x) = \frac{1}{\ln 10} \frac{d}{dx} 10^x = \frac{1}{\ln 10} 10^x \ln 10 = 10^x$ .

**Problem 3. Section 3.9 #338**

This is just Equation 3.35 in the book:  $f'(x) = 3^{\sin(3x)} (\ln 3) \frac{d^2}{dx^2} (\sin(3x))$ . So we need to compute the second derivative of  $\sin(3x)$  using the chain rule. The first derivative is  $3 \cos(3x)$ , so the second derivative is  $-9 \sin(3x)$ . Thus we have  $f'(x) = 3^{\sin(3x)} (\ln 3) (-9 \sin(3x))$ .

**Problem 4. Section 3.9 #340**

This is the chain rule, to get that  $f'(x) = \frac{1}{4x^3+x} (12x^2 + 1)$ .

**Problem 5. Section 3.9 #344**

A log property tells us that  $f(x) = 5 \log_7(6x^4 + 3)$ . Chain rule then gives us that  $f'(x) = 5 \left( \frac{24x^3}{(6x^4+3) \ln 7} \right)$ .