Here are some sample questions from sections 2.6–2.8 and 3.2. Some topics that we covered are not represented by these questions, but are still fair game.

1. Use implicit differentiation to find an equation for the tangent line to the curve defined by
$$x^2 + 2xy - y^2 + x = 2$$
   at the point $(1, 2)$.

2. If $y = 4x^3$ and $\dfrac{dx}{dt} = 5$, find $\dfrac{dy}{dt}$ when $x = 2$.

3. A kite 100 feet above the ground moves horizontally at a speed of 8 feet per second. At what rate is the angle between the string and the horizontal decreasing when 200 feet of string has been let out?

4. Use a linear approximation (or differentials) to estimate $\sqrt{99.8}$.

5. Find the inverse function of $f(x) = \dfrac{x+1}{2x+1}$.

6. For the function
$$f(x) = \sqrt{x^3 + x^2 + x + 1}$$
   find $(f^{-1})'(2)$.

7. (a) Solve the equation $\ln(x) + \ln(x-1) = 1$ for x.

   (b) Find $\lim\limits_{x \to 0^+} \ln(\sin(x))$.