1. Let $f(x) = (3x^2 + 1)^2$. We are going to find the derivative of $f(x)$ in three ways and then compare the answers.

   (a) Algebraically multiply out the expression for $f(x)$ and then take the derivative.
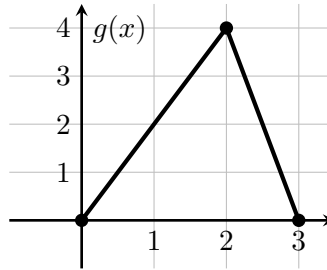
   (b) View $f(x)$ as a product of two functions, $f(x) = (3x^2 + 1)(3x^2 + 1)$ and use the product rule to find $f'(x)$.

   (c) Apply the chain rule directly to the expression $f(x) = (3x^2 + 1)^2$

   (d) Are your answers in parts a, b, and c the same? Why or why not?

2. Let $f(x)$ and $g(x)$ be two functions. Values of $f(x)$ and $f'(x)$ are given in the table below and the graph of $g(x)$ is as shown.

x	1	2	3
$f(x)$	3	2	1
$f'(x)$	4	5	6

(a) Let $h(x) = g(f(x))$. Find $h'(3)$.

(b) Let $k(x) = f(g(x))$. Find $k'(1)$.

3. The US population on July 1 of 2010 was 309.33 million. The population was 311.59 million on July 1 of 2011.

(a) Find an exponential model $p(t)$ to fit this data. Let $t = 0$ on July 1, 2010.

(b) Use your model to estimate the US population on November 1 of 2013.

(c) Find $p'(3)$. Interpret the meaning of this number, including units.