1. (1.7.17) Find $k$ so that the following function is continuous on any interval:

$$f(x) = \begin{cases} 
  kx & x < 2 \\
  -x^2 & 2 \leq x 
\end{cases}$$

(2 points) Draw graph of second piece or calculate $f(2) = -4$.

(3 points) Determine $k$ such that the graph of first piece approaches the point $(2, -4)$ or $k = -2$.

2. (2.2.37) Find the derivative of $g(x) = \frac{1}{x}$ at $x = -1$ algebraically. Use the definition, $f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$.

(1 point) Write limit definition of $g'(-1)$, $g'(-1) = \lim_{h \to 0} \frac{g(-1+h) - g(-1)}{h}$.

(1 point) Evaluate function, $\lim_{h \to 0} \frac{1}{h} = \lim_{h \to 0} \frac{(-1+h) - (-1)}{h}$.

(2 points) Simplify difference quotient, $\lim_{h \to 0} \frac{1}{h \cdot (-1+h)} = \lim_{h \to 0} \frac{h}{h \cdot (-1+h)} = \lim_{h \to 0} \frac{1}{-1+h}$.

(1 point) Evaluate limit, $\lim_{h \to 0} \frac{1}{-1+h} = \frac{1}{-1} = -1$.