Graph the function given below.

1. $y = 1$  
2. $y = 1$  
3. $y = -1$  
4. $y = -2$  
5. $y = -3$  
6. Does not exist
3. (a) Find, for each given function, the derivative of the function. Include the units in each derivative.

\[ f(x) = x^3 \]
\[ f'(x) = 3x^2 \quad \text{(units)} \]

\[ g(x) = 5 \]
\[ g'(x) = 0 \quad \text{(units)} \]

\[ h(x) = x + 2 \]
\[ h'(x) = 1 \quad \text{(units)} \]
4. Let \( f(x) = e^{-x^2} \). Find the maximum value of \( f(x) \) on \( [a, b] \).

\[ f(x) = e^{-x^2} \]

The maximum value of \( f(x) \) on \( [a, b] \) is found by evaluating \( f(x) \) at the endpoints of the interval.

5. In terms which may be the addition of the given facts that the structure of the following arguments involves the logical conclusion that the student should be able to make.

\[ \frac{\delta^2}{\delta x^2} \left( \frac{1}{x^2} \right) = \frac{2}{x^3} \]
\[ \phi(x) = \frac{4(\lambda \omega - \Phi)}{\lambda} \]

\[ \begin{align*}
&\frac{\lambda^2}{F^2} \left( \frac{F^2 - \Phi^2}{\lambda^2} \right) \left( \frac{F^2 - \Phi^2}{\lambda^2} \right) \\
&\frac{\lambda^2}{F^2} \left( \frac{F^2 - \Phi^2}{\lambda^2} \right) \\
&\frac{\lambda^2}{F^2} \left( \frac{F^2 - \Phi^2}{\lambda^2} \right) \\
&\frac{\lambda^2}{F^2} \left( \frac{F^2 - \Phi^2}{\lambda^2} \right)
\end{align*} \]
1. (Physics) The position of a falling object is given by the function
   \[ x(t) = 100 + 9.8t + 4.9t^2. \]
   (a) Find the average velocity over the interval \([0, 5]\).
   \[
   \frac{x(5) - x(0)}{5 - 0} = \frac{(100 + 9.8(5) + 4.9(5)^2) - (100 + 9.8(0) + 4.9(0)^2)}{5 - 0}
   \]
   \[
   = \frac{(100 + 49 + 122.5) - (100 + 0 + 0)}{5}
   \]
   \[
   = \frac{272.5}{5} = 54.5. \]

   (b) Find the instantaneous velocity of the object at \(t = 2\).
   \[
   v(t) = \frac{dx}{dt} = 9.8 + 2 \times 4.9t.
   \]
   \[
   v(2) = 9.8 + 2 \times 4.9(2) = 9.8 + 9.8 = 19.6. \]
4. If given the function \( f(x) = \frac{y}{x^2} \), find the appropriate slope:

\[
\frac{dy}{dx} = \frac{-2xy}{x^4} = \frac{-2y}{x^3}
\]

Horizontal asymptote at \( y = 1 \).

(b) Evaluate \( f(x) = \frac{1}{x^2} \).

(c) Find all the critical values of \( f(x) \).

Then there may be an inflection point at \( x = 2 \).

\[
\frac{d^2y}{dx^2} = \frac{-4xy}{x^4} = \frac{-4y}{x^3}
\]

Having \( f''(x) \) only a removable discontinuity at \( x = 2 \).