Examples 1.3 – Derivatives of Linear Functions

1. Find the first and second derivatives of $y = 4x + 1$, $g(t) = 3 - 5t$, and $h(r) = 1.344$.

   Solution:

2. The rate of change of the position over time of a moving object is its **velocity** $v(t)$, and the rate of change of velocity over time is its **acceleration** $a(t)$. If the position of an object after t minutes is given by $s(t) = 65t + 20$ cm, then what are its velocity and acceleration functions?

   Solution:

3. For each part, sketch an example of a (possibly nonlinear) graph having the given properties.

   (i) A constant derivative of two.
   (ii) A negative derivative at $x = 1$, and a positive derivative at $x = 3$.
   (iii) A zero derivative at $x = -1$, positive derivatives on the interval $(-1, 2)$, and a zero derivative at $x = 2$.

   Solution: