1. [13 points] Consider the functions \( f(x) \) and \( g(x) \), where \( g(x) = 2 - \frac{1}{2}x \) and the graph of \( y = f(x) \) is shown below.

![Graph of y = f(x)](image)

a. [9 points]
   i) Compute the value of the following expressions. Write "Undefined" if the value of the expression is not defined or there is not enough information to be computed.

   \[
   \begin{align*}
   Solution: \quad 2f(-2) + 3f(4) &= 2(5) + 3(-2) = 4 \quad f^{-1}(3) = 2 \\
   f(g(2)) &= f(2 - 0.5(2)) = f(1) = 3.5 \quad g(g^{-1}(5)) = 5
   \end{align*}
   \]

   ii) Find the horizontal and vertical intercepts of the function \( y = f(g(x)) \).

   Solution:
   \[\text{Horizontal intercept: If } f(g(x)) = 0 \text{ then } g(x) = 3. \text{ Hence } 2 - \frac{1}{2}x = 3 \text{ then } x = -2. \text{ Hence the horizontal intercept is at } (-2,0).\]
   \[\text{Vertical intercept: } y = f(g(0)) = f(2) = 3. \text{ Hence the vertical intercept is at } (0,3).\]

   iii) Find the average rate of change of \( f(x) \) between \( x = 2 \) and \( x = 5 \). Show your work.

   Solution: Average rate of change of \( f(x) = \frac{f(5) - f(2)}{5 - 2} = \frac{-4 - 3}{3} = -\frac{7}{3} \).

b. [4 points] Find a piecewise defined formula for \( f(x) \).

   Solution:
   \[
   f(x) = \begin{cases} 
   4 - \frac{1}{2}x & \text{if } -4 \leq x \leq 2 \\
   -2x + 6 & \text{if } 2 < x \leq 5 
   \end{cases}
   \]