6. [10 points] Mr. and Mrs. Johnson have 4 children: Alana, Brentley, Clarissa, and Donovan. Let $A(t)$, $B(t)$, $C(t)$, and $D(t)$ denote the height, in inches, of Alana, Brentley, Clarissa, and Donovan, respectively, at time t, measured in years since January 1, 1990. Alana was born on January 1, 1990.

a. [3 points] Alana and Brentley are twins (i.e. they were born at the same time), but Brentley is shorter. He is always 5% shorter than Alana. Write a formula for $B(t)$ in terms of $A(t)$.

Solution: Brentley is 5% shorter than Alana, so his height is 0.95 times the height of Alana. This means that $B(t) = 0.95A(t)$.

Answer: $B(t) =$ _____ $0.95A(t)$ _____

b. [3 points] Clarissa was born exactly 4 years after Alana. Clarissa is always the same height as Alana was when she was the same age. Write a formula for $C(t)$ in terms of $A(t)$.

Solution: In year t, Clarissa is the same age as Alana was 4 years earlier, in year $t - 4$. Since Clarissa is the same height as Alana was when she was the same age, we find $C(t) = A(t - 4)$.

Answer: $C(t) =$ _____ $A(t - 4)$ _____

c. [4 points] Donovan was born exactly 6 years after Brentley. However, Donovan has a larger build, and is always 4 inches taller than Brentley was at the same age. Below, you are given a portion of the graph of $y = B(t)$. The coordinates of four points on the graph are labeled. Using this information, sketch as much as possible of the graph of $y = D(t)$ on the same axes. **Label four points on your graph**.

Solution: In year t, Donovan is the same age as Brentley was 6 years earlier, in year $t - 6$. Donovan is 4 inches taller than Brentley was at the same age, so we have $D(t) = B(t - 6) + 4$. This means that the graph of $y = D(t)$ is obtained from the graph of $y = B(t)$ by shifting 6 units to the right and 4 units upwards.