1. Suppose that, in order to purchase your first house, you get a 30-year loan for a particular dollar amount. The amount of your monthly payment depends on the interest rate of the load. Define a function $M$ by

$$M(r) = \text{your monthly payment, if the interest rate is } r\%$$

(a) Translate into English: $M(4) = 895$
(b) Translate into English: $M'(4) = 120$

2. Suppose you are filling a balloon with water, and further suppose that this balloon always maintains a perfectly spherical shape. Define a function $W$ by

$$W(r) = \text{the weight (in pounds) of the balloon when its radius is } r\text{ inches}$$

(a) Translate into English: $W(4) = 9.69$
(b) Translate into English: $W'(4) = 7.26$
(c) Translate into English: $W'(10) = 45.4$
(d) Using your knowledge of water and balloons (not your knowledge of math), explain why $W'(10)$ is so much bigger than $W'(4)$.

3. If you are travelling 60 mph and you hit the brakes as hard as you can, it will take you some time to come to a complete stop. The amount of time it takes depends on the age of your tires. New tires will allow you to stop faster. Older tires will take longer to bring you to a stop. Let

$$T(a) = \text{the time required to come to a complete stop, given that your tires are } a\text{ years old.}$$

(a) Translate into plain English: $T(1) = 9$.
(b) What are the units on $T'(a)$?
(c) Is $T'$ positive or negative? Explain.