Name: _____

2.4 Interpretations of the Derivative

1. The cost of extracting T tons of ore from a copper mine is $C = f(T)$ dollars.

   (a) What does it mean to say that $f(2000) = 310000$? Give units.

   (b) What does it mean to say that $f'(2000) = 100$? Give units.

2. Let $W(h)$ be an invertible function which tells how many gallons of water an oak tree of height h feet uses in a given 24 hour period.

   (a) What does $W(50)$ mean? What are the units?

   (b) What does $W^{-1}(40)$ mean? What are the units?

   (c) What does $W'(5) = 3$ mean? What are the units on the 5 and 3?

   (d) BONUS: What does $(W^{-1})'(40)$ mean? Would you expect it to be positive or negative?

3. Low tide at Bandon, OR occurs at about 8am on Jan. 25, 2023, at a height of +2. The tide rises slowly at first, then more quickly, rising the fastest at 12PM, before slowing again. High tide is reached at 3pm.

   (a) Sketch a possible graph of $H = f(t)$, where H is the height of the tide in Bandon (in feet) and t represents the time (in hours) after midnight.

   (b) Explain, in terms of feet and hours, what each of the following represents:
   (i) $f(8)$ (ii) $f(12) = 5.5$ (iii) $f'(12) = 1.5$ (iv) $f'(15)$

   (c) Use the statements given in parts (iii) and (iv) from above to estimate the height of the tide at 3pm. Is the actual height higher or lower than the estimate?