

Name: _____
Group Members Present: _____

Grade: _____

_____, _____, & _____

1. f is a function of t and t is a function of x ; they can be composed to form $f \circ t$ as a function of x

- $f(6) = 140$ and $f'(6) = -27$
- $t(2) = 6$ and $t'(2) = 1.3$

Evaluate or calculate the following

- a. $f(t(2)) =$ b. $\left. \frac{df}{dt} \right|_{t=6} =$ c. $\left. \frac{dt}{dx} \right|_{x=2} =$
- d. $\left. \frac{df}{dx} \right|_{x=2} =$

3. $p(t)$ people gives the attendance at an amusement park where t is the temperature in degrees Fahrenheit. $r(p)$ thousand dollars gives the daily revenue for the amusement park where p is the number of people in attendance.

- $p(85) = 5540$ people and $\left. \frac{dp}{dt} \right|_{t=85} = -208$ people per $^{\circ}F$

- $r(5540) = 149.580$ thousand dollars and $\left. \frac{dr}{dp} \right|_{p=5540} = 0.028$ thousand dollars per visitor

- a. When the temperature is $85^{\circ}F$, how quickly is the park's daily revenue changing with respect to temperature?

- b. Calculate the attendance at the amusement park when the temperature drops from $85^{\circ}F$ to $83^{\circ}F$.

4. Write an expression for $\frac{df}{dt}$ with only one input variable when $f(x) = \ln x$ and $x(t) = 5t + 11$.
5. The population of South Carolina can be modeled by $p(t) = 3.48(1.023^t)$ million people, t years after 1990.
The number of registered Republicans in South Carolina is given by $r(p) = 0.424p$ million when the population of South Carolina is p million people.
- a. Write an expression for $\frac{dp}{dt}$, the rate of change in the population of South Carolina with respect to time. Include units of measure.
- b. Write an expression for $\frac{dr}{dp}$, the rate of change in the number of registered Republicans in South Carolina with respect to the population of South Carolina. Include units of measure.
- c. Write an expression for $\frac{dr}{dt}$ to determine how rapidly the number of registered Republicans in South Carolina changing with respect to time. The expression should be in terms of t and include units of measure.