

Classroom Voting Questions: Calculus I

2.4 Interpretations of the Derivative

1. The radius of a snowball changes as the snow melts. The instantaneous rate of change in radius with respect to volume is

- (a) $\frac{dV}{dr}$
- (b) $\frac{dr}{dV}$
- (c) $\frac{dV}{dr} + \frac{dr}{dV}$
- (d) None of the above

2. Gravel is poured into a conical pile. The rate at which gravel is added to the pile is

- (a) $\frac{dV}{dt}$
- (b) $\frac{dr}{dt}$
- (c) $\frac{dV}{dr}$
- (d) None of the above

3. A slow freight train chugs along a straight track. The distance it has traveled after x hours is given by a function $f(x)$. An engineer is walking along the top of the box cars at the rate of 3 mi/hr in the same direction as the train is moving. The speed of the man relative to the ground is

- (a) $f(x) + 3$
- (b) $f'(x) + 3$
- (c) $f(x) - 3$
- (d) $f'(x) - 3$

4. $C(r)$ gives the total cost of paying off a car loan that has an annual interest rate of r %. What are the units of $C'(r)$?

- (a) Year / \$
- (b) \$ / Year
- (c) \$ / %
- (d) % / \$

5. $C(r)$ gives the total cost of paying off a car loan that has an annual interest rate of r %. What is the practical meaning of $C'(5)$?
- The rate of change of the total cost of the car loan is $C'(5)$.
 - If the interest rate increases by 1%, then the total cost of the loan increases by $C'(5)$.
 - If the interest rate increases by 1%, then the total cost of the loan increases by $C'(5)$ when the interest rate is 5%.
 - If the interest rate increases by 5%, then the total cost of the loan increases by $C'(5)$.
6. $C(r)$ gives the total cost of paying off a car loan that has an annual interest rate of r %. What is the sign of $C'(5)$?
- Positive
 - Negative
 - Not enough information is given
7. $g(v)$ gives the fuel efficiency, in miles per gallon, of a car going a speed of v miles per hour. What are the units of $g'(v) = \frac{dg}{dv}$?
- (miles)²/[(gal)(hour)]
 - hour/gal
 - gal/hour
 - (gal)(hour)/(miles)²
8. $g(v)$ gives the fuel efficiency, in miles per gallon, of a car going a speed of v miles per hour. What is the practical meaning of $g'(55) = -0.54$?
- When the car is going 55 mph, the rate of change of the fuel efficiency decreases to 0.54 miles/gal.
 - When the car is going 55 mph, the rate of change of the fuel efficiency decreases by 0.54 miles/gal.
 - If the car speeds up from 55 to 56 mph, then the fuel efficiency is 0.54 miles per gallon.
 - If the car speeds up from 55 to 56 mph, then the car becomes less fuel efficient by 0.54 miles per gallon.