

Module 5 Investigations 1 and 2

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Key Conclusions:

- Key Conclusion 1: a function is concave up on an interval if its average rate of change is increasing on that interval.
- Key Conclusion 2: a function is concave down on an interval if its average rate of change is decreasing on that interval.

Question (Clicker Question # 52)

You are draining water from your bathtub. You pull the drain plug and record the number of minutes that have elapsed and the height of the water in centimeters. According to this table of values, which of the following is correct?

- 1 The graph of d vs. t is concave up and the rate at which d is decreasing is increasing.*
- 2 The graph of d vs. t is concave up and the rate at which d is decreasing is decreasing.*
- 3 The graph of d vs. t is concave down and the rate at which d is decreasing is increasing.*
- 4 The graph of d vs. t is concave down and the rate at which d is decreasing is decreasing.*

Δt interval	$\Delta d / \Delta t$ (approximately)
1 to 1.5	-8.5
1.5 to 2.6	-7.2
2.6 to 4.5	-4.21

Question (Clicker Question # 53)

Imagine that you are skydiving. The graph of your speed as a function of time from the time you jumped out of the plane to the time you achieved terminal velocity is

- ① *increasing and concave up*
- ② *decreasing and concave up*
- ③ *increasing and concave down*
- ④ *decreasing and concave down*

Question (Clicker Question # 54)

Water is being poured into a “Dixie cup” (a standard cup that is smaller at the bottom than at the top). The height of the water in the cup is a function of the volume of water in the cup. The graph of this function is

- ① *increasing and concave up*
- ② *increasing and concave down*
- ③ *a straight line with positive slope.*
- ④ *All of the above.*

Question (Bonus Question # 1)

The graph of h represents the distance (measured in feet) of a gopher from its home as a function of the time (number of seconds) since the gopher left. At what approximate value(s) of time since leaving does the gopher's velocity (average rate of change of distance with respect to time) change from increasing to decreasing?

- 1 13 seconds
- 2 14 seconds
- 3 7.5 and 16 seconds
- 4 11 seconds
- 5 None of the above

