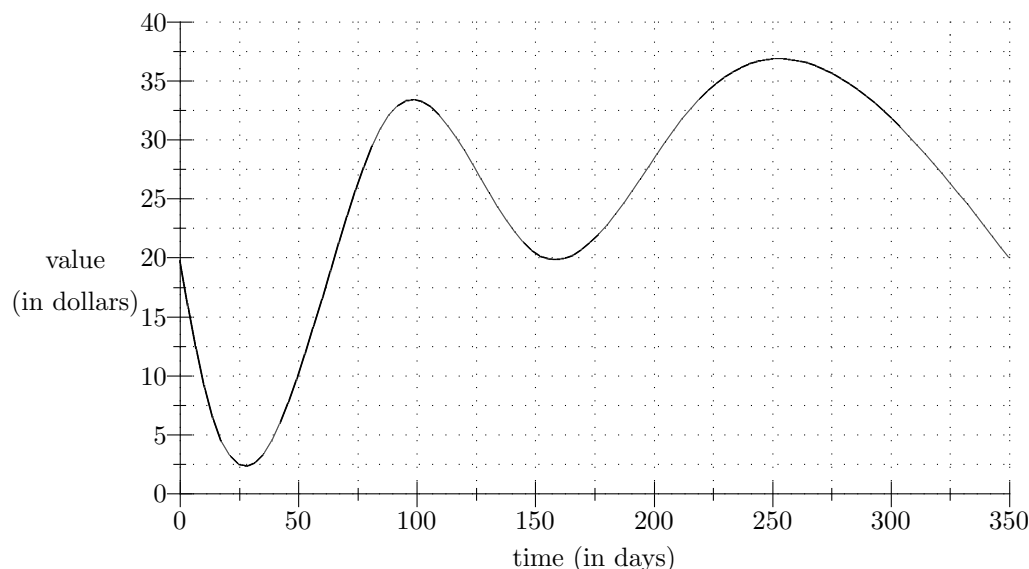


Math 111

Solutions for Group Activity: Change and Average Change

1. Below is a graph of the value vs. time for one share of stock for a company named Banana Patch.



NOTE: Since we're approximating from a graph, your answers may not be exactly the same as mine.

- (a) What is the value of one share of stock on day 300?

ANSWER: ~\$32

- (b) How much does the value of one share of stock change during the first 300 days?

ANSWER: ~\$13

- (c) How much, in dollars per day, does the value of one share of stock change *on average* in the first 300 days?

ANSWER: $\sim \frac{\$13}{300 \text{ days}} = \frac{\$0.04}{\text{day}}$

- (d) Can you describe your answer to part (c) in graphical terms as the slope of a line on this graph? Be specific.

ANSWER: It's the slope of the line that goes through the value vs. time graph at day 0 and day 300.

- (e) How much, in dollars per day, does the value of one share of stock change *on average* from the 50th day to the 100th day?

ANSWER: $\sim \frac{\$33 - 11}{50 \text{ days}} = \frac{\$0.44}{\text{day}}$

- (f) Can you describe your answer to part (e) in graphical terms as the slope of a line? Be specific.

ANSWER: It's the slope of the line that goes through the value vs. time graph at day 50 and day 100.

- (g) You have \$1000 that you would like to invest in Banana Patch. On day 0, you buy as many shares as you can afford. What is your investment worth on day 125?

ANSWER: Your answer here will depend on how you interpret the height of the graph on day 0. Many people see it as \$20 but some see it as \$19. (You might see it as something in between—that's ok, too!)

If you see the value on day 0 as \$20, then you will be able to afford 50 shares of stock. After 125 days, each share is worth approximately \$27.50 and your total investment is worth $50 \times 27.50 = \$1375$.

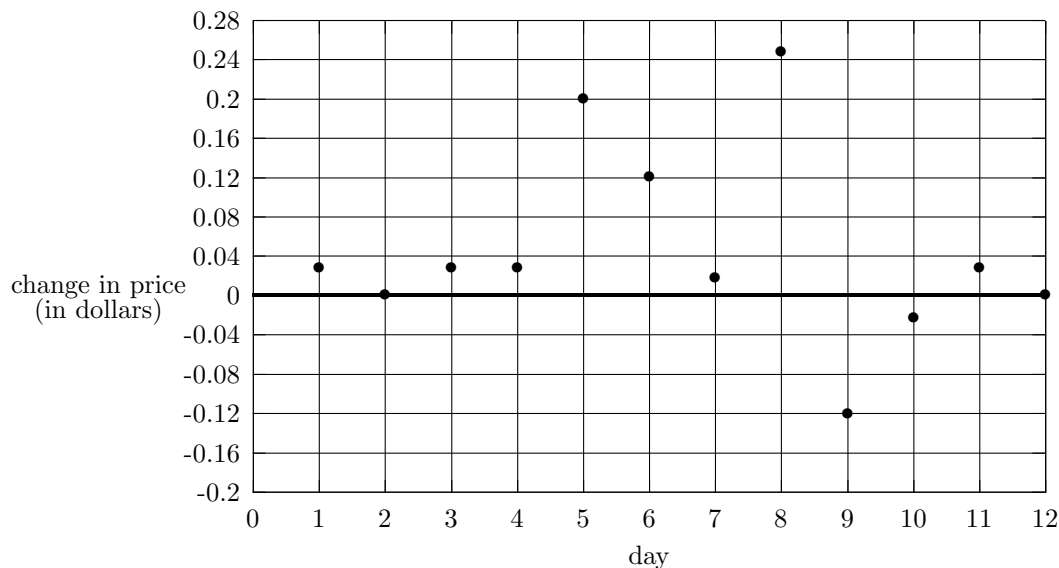
If you see the value on day 0 as \$19, then you will be able to afford 52 **whole** shares of stock. After 125 days, each share is worth approximately \$27.50 and your total investment is worth $52 \times 27.50 = \$1430$.

Other answers are possible.

- (h) How much, in dollars per day, does the value of your investment from part (g) change *on average* from day 0 to day 125?

ANSWER: Using the \$1375 figure from part (g), it's $\frac{\$1375 - 1000}{125 \text{ days}} = \frac{\$3}{\text{day}}$.

2. The *opening price* of a stock is the value of the stock when the stock market opens. The opening price of one share of stock for the Mambo Dog Company is monitored over several days. The graph below gives the **change** in the opening price since the previous day. For example, the change in price at $t = 1$ is \$0.03, which means that the opening price of the stock on day 1 is \$0.03 higher than the opening price on day 0.



- (a) Suppose the opening price of Mambo Dog is \$5.35 on day 0. What is the opening price on day 4?
ANSWER: From day 0 to day 1, the price goes up by \$0.03. So, on day 1, opening price is \$5.38. From day 1 to day 2, the change in price is \$0. So, on day 2, price is still \$5.38. From day 2 to day 3, price changes by \$0.03 and is, therefore, \$5.41 on day 3. From day 3 to day 4, it changes by **another** \$0.03. So, the opening price on day 4 is \$5.44.
- (b) How much higher is the opening price on day 5 than on day 3?
ANSWER: The price goes up by \$0.03 from day 3 to day 4 and another \$0.20 from day 4 to day 5. So, the price is \$0.23 higher on day 5 than day 3.
- (c) Name all days on which the opening price of Mambo Dog was the same as the day before.
ANSWER: This will happen whenever the change in price is \$0. The opening price on day 2 is the same as the day before and the opening price on day 12 is the same as the day before.
- (d) i. Is the opening price higher on day 5 or day 6? Explain.
ANSWER: The change in price from day 5 to day 6 is \$0.12. (The height of the dot above day 6.) So, the price goes up from day 5 to day 6. Price is higher on day 6.
 (Notice that the height of the dot above day 5 is irrelevant here—it gives the change from day 4 to day 5.)
- ii. Is the opening price higher on day 9 or day 10? Explain.
ANSWER: The change in price from day 9 to day 10 is -\$0.02 (the height of the dot at day 10). So, the price goes down from day 9 to day 10. Price is higher on day 9.
 (Again, the position of the dot on day 9 is irrelevant. Why?)