

Math 1311

Homework 11 (Section 6.1- Section 6.5)

Record your answers to all the problems in the EMCF titled “ **Homework 11**” .

1. A car is driving at a constant velocity of 74 miles per hour. A perspective has been chosen so that directed distance is increasing. Since the velocity is constant, we know that directed distance is a linear function. What is the slope of that linear function?
 - a. 74 miles per hour
 - b. 37 miles per hour
 - c. -74 miles per hour
 - d. -37 miles per hour

2. The price P of gasoline increases to a maximum and then stays at a fixed price. What is the rate of change $\frac{dP}{dt}$ and how is it changing at the time when the price reaches a maximum?
 - a. $\frac{dP}{dt}$ is negative at the maximum and is decreasing.
 - b. $\frac{dP}{dt}$ is equal to zero at the maximum and remains the same.
 - c. $\frac{dP}{dt}$ is positive at the maximum and is decreasing.
 - d. $\frac{dP}{dt}$ is negative at the maximum and is increasing.

3. What is rate of change in directed distance?
 - a. Speed
 - b. Acceleration
 - c. Velocity
 - d. Displacement

4. When the graph of directed distance is decreasing, is the graph of velocity above or below the horizontal axis?
 - a. Below the Horizontal Axis
 - b. Above the Horizontal Axis
 - c. At the Horizontal Axis
 - d. This is not the correct answer

5. A graph of directed distance reaches a maximum. What is the velocity there?
- Positive
 - Negative
 - Zero
 - This is not the correct answer
6. A car is driving at a constant velocity of 60 miles per hour. A perspective has been chosen so that directed distance is increasing. Since velocity is constant, we know that the directed distance is a linear function. What is the slope of that linear function?
- 40 miles per hour
 - 50 miles per hour
 - 60 miles per hour
 - 70 miles per hour
7. If from ground level we toss a rock upward with a velocity of 30 feet per second, we can use elementary physics to show that the height in feet of the rock above the ground t seconds after the toss is given by $S = 30t - 16t^2$. How high does the rock go?
- 18.06
 - 17.06
 - 15.06
 - 14.06
8. If from ground level we toss a rock upward with a velocity of 30 feet per second, we can use elementary physics to show that the height in feet of the rock above the ground t seconds after the toss is given by $S = 30t - 16t^2$. When does the rock strike the ground?
- 3.88 seconds after it is tossed
 - 2.88 seconds after it is tossed
 - 1.88 seconds after it is tossed
 - 0.88 seconds after it is tossed

9. The following table shows the cumulative number of cases of SARS (severe acute respiratory syndrome) on selected days during the outbreak in 2003. Here t is time in days since the beginning of April and N is the cumulative number of cases reported by time t .

t	19	22	24	29
N	3547	3947	4439	5642

Approximate the value of $\frac{dN}{dt}$ at $t=19$ using the average rate of change from $t=19$ to $t=22$.

- a. 155.55 cases per day
 - b. 144.44 cases per day
 - c. 133.33 cases per day
 - d. 122.22 cases per day
10. If $\frac{df}{dx}$ has a constant value of 10, we know that f is a linear function. What is the slope of f ?
- a. 10
 - b. 20
 - c. 30
 - d. 40
11. Suppose $f = f(x)$ satisfies $f(3) = 8$ and $f(3.005) = 7.972$. Estimate the value of $\frac{df}{dx}$ at $x=3$.
- a. - 7.6
 - b. - 6.6
 - c. - 5.6
 - d. - 4.6
12. By direct calculation, estimate the value of $\frac{df}{dx}$ for $f(x) = \frac{1}{x^2}$ at $x=4$. Use an increment of 0.0001.
- a. - 0.01
 - b. - 0.02
 - c. - 0.03
 - d. - 0.04

13. If f satisfies the equation of change $\frac{df}{dt} = 5$, then f is a linear function. What is the slope of f ?

- a. 5
- b. 6
- c. 7
- d. 8

14. The water level in a tank rises 4 feet every minute. Write an equation of change that describes the height H , in feet, of the water level at time t in minutes.

- a. $\frac{dH}{dt} = 3$
- b. $\frac{dH}{dt} = 4$
- c. $\frac{dH}{dt} = 5$
- d. $\frac{dH}{dt} = 6$

15. A balloon leaks air (changes in volume) at a rate of one-third the volume per minute. Write an equation of change that describes the volume V of air in balloon at time t in minutes.

- a. $\frac{dV}{dt} = \frac{-1}{3}V$
- b. $\frac{dV}{dt} = \frac{-1}{4}V$
- c. $\frac{dV}{dt} = \frac{-1}{5}V$
- d. $\frac{dV}{dt} = \frac{-1}{6}V$

16. What is the common mathematical term for an equation of change?

- a. Constant Equation
- b. Differential Equation
- c. Irrational Equation
- d. None of the above

17. Solve the equation of change $\frac{df}{dx} = 3$ if the initial value of f is 7.

- a. $f = 4x + 8$
- b. $f = 3x + 7$
- c. $f = 2x + 6$
- d. $f = x + 5$

18. Find an equilibrium solution $\frac{df}{dx} = 2f - 6$.

- a. $f = 2$
- b. $f = 3$
- c. $f = 4$
- d. $f = 5$

19. Water flows into a tank, and a certain part of it drains out through a valve. The volume v (in cubic feet) of water in the tank at time t satisfies the equation $\frac{dv}{dt} = 5 - \left(\frac{v}{3}\right)$. If the process continues for a long time, how much water will be in the tank?

- a. 13 cubic feet
- b. 14 cubic feet
- c. 15 cubic feet
- d. 16 cubic feet

20. For the equation of change $\frac{df}{dx} = 5f - 7$, determine whether f is increasing or decreasing when $f = 1$.

- a. Increasing
- b. Decreasing
- c. Stays the same
- d. This is not the correct answer