

Math 191 Assignment 2

Covers: Sections 24.1-24.5, 24.7, 24.8

Due: Mon Oct 26 at 8:30am

INSTRUCTIONS:

This assignment will be marked for completion.

Solutions will be posted on the course website 24 hours after the deadline.

You may not copy the work of another person or AI.

Submit jpg or pdf files to the D2L Dropbox.

1. Find the equation of the normal line to $y = \frac{7}{x^2} - 3\sqrt{x}$ at $x = 1$. Express your answer in the form $ax + by + c = 0$.

2. We want to approximate a solution to $2x^5 - 19x^2 + 3 = 0$.

Use $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ with $x_0 = 2$ to find x_1 .

Round x_1 to two decimal places. You do **not** need to find x_2 .

3. An object's position (in m) after t seconds is given below. Find the magnitude and direction of the object's velocity at $t = 3$ seconds. Round your values to one decimal place.

$$x = 27t^{-2} + 1, \quad y = 7t^2 + 2t$$

4. The pressure P and volume V of a gas are related by $P = \frac{k}{V}$, where k is a **constant**. The volume is 600 cm^3 when the pressure is 200 kPa . The volume is increasing at $20.0 \text{ cm}^3/\text{min}$. How fast is the pressure changing when the volume is 800 cm^3 ?

5. Let $f(x) = -x^3 + 9x^2 - 24x + 5$. For which x -values is $f(x)$ decreasing?

6. We cut the corners from a $24\text{cm} \times 24\text{cm}$ metal sheet to form an open-topped box. Find the height of the box that maximizes the box's volume.

7. Let $f = 12x^3$. Find $\frac{df}{f}$ given that $\frac{dx}{x} = 0.07$.