1. Two cars start moving from the same point. One travels north at 60 mph and the other travels east at 25 mph. At what rate is the distance between the cars increasing two hours later?

2. Each side of a square is increasing at a rate of 6 cm/s. At what rate is the area of the square increasing when the area of the square is 16 cm^2 ?

3. Find the linearization of $g(x) = \dfrac{1}{\sqrt{x}}$ near $x = 4$.

4. Find the absolute maximum and the absolute minimum values of the indicated function on the given interval:

   (a) $f(x) = \dfrac{\ln x}{x^2}$ on $\left[\dfrac{1}{2}, 4\right]$,

   (b) $f(t) = \dfrac{\sqrt{t}}{1+t^2}$ on $[0, 2]$,

   (c) $f(x) = xe^{x/2}$ on $[-3, 1]$,

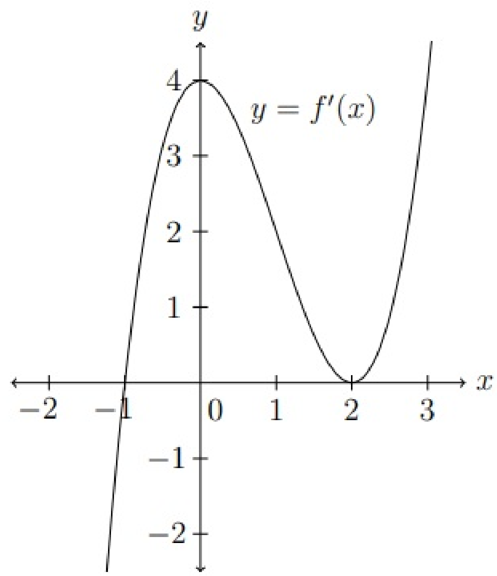
   (d) $f(x) = 3x^4 - 4x^3 - 12x^2 + 1$ on $[-2, 3]$.

5. Verify that the function satisfies the hypotheses of the Mean Value Theorem on the given interval. Then find all numbers c that satisfy the conclusion of the Mean Value Theorem.

   (a) $f(x) = 2x^2 - 3x + 1,\ [0, 2]$

   (b) $f(x) = \dfrac{1}{x},\ [1, 4]$

6. Below is a graph of $y = f'(x)$. Determine the intervals where $f(x)$ is increasing and decreasing on $[-1, 3]$, the x-values where $f(x)$ has local maxima and minima, and the x-values where $f(x)$ has inflection points.



7. Find the intervals on which the indicated function is increasing or decreasing, find the local maximum and minimum of the function, and find the intervals of concavity and inflection points.

   (a) $f(x) = x^3 - 3x^2 - 9x + 4$

   (b) $f(x) = 2x^3 - 9x^2 + 12x - 3$

   (c) $f(x) = x^4 - 2x^2 + 3$

   (d) $f(x) = e^{2x} + e^{-x}$

Cont.

8. Find the limits using l'Hospital's Rule. If l'Hospital's Rule doesn't apply, explain why.

   (a) $\lim_{x \to 0} \dfrac{\tan(3x)}{\sin(2x)}$

   (b) $\lim_{x \to 0} \dfrac{e^x - 1 - x}{x^2}$

   (c) $\lim_{x \to \infty} x^3 e^{-x^2}$

   (d) $\lim_{x \to 1} \dfrac{x^8 - 1}{x^5 - 1}$

9. Find two numbers whose difference is 100 and whose product is minimum.

10. If 12 m^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

11. Use Newton's method to approximate $\sqrt[4]{74}$ using $x_1 = 3$. Note that in Newton'w method,

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}.$$

12. Use Newton's method with $x_1 = -1$ to find x_2, the second approximation to the root of $2x^3 - 3x^2 + 2 = 0$.

The End.