

Name: _____

VIP ID: _____

- Write your name and VIP ID in the space provided above.
- The test has six (6) pages, including this one.
- Credit for each problem is given in parentheses at the right of the problem number.
- You must show sufficient work to justify all answers except on multiple-choice questions. Correct answers with inconsistent or no work will not be given credit.
- No books or notes may be used on this test.
- An approved calculator may be used on this test.

Page	Max. points	Your points
2	20	
3	15	
4	30	
5	25	
6	10	
Total	100	

Problem 1 (5 pts). The graph below is a representation of which of the following functions?

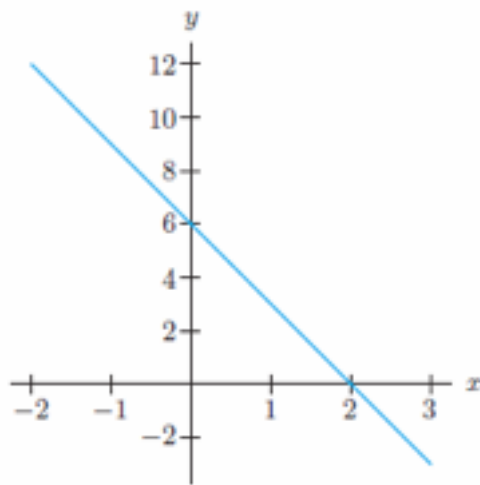


Figure 1.3

- ☐ $y = 6x + 6$
- ☐ $y = -3x + 6$
- ☐ $y = -3x + 2$
- ☐ $y = 6x - 2$

Problem 2 (5 pts). We are trying to decide between two plumber companies to fix a sink. The first company charges \$50 for a service call, plus an additional \$36 per hour for labor. The second company charges \$35 for a service call, plus an additional \$39 per hour of labor. At how many hours will the two companies charge the same amount of money?

Problem 3 (5 pts each). Evaluate the following definite integrals.

(a) $\int_0^4 \ln(y^2 + 1) dy =$

(b) $\int_{10}^{103} 9xe^{30x^2} dx =$

Problem 4 (5 pts). If the graph below is that of $f'(x)$, which of the following statements is true concerning this function?

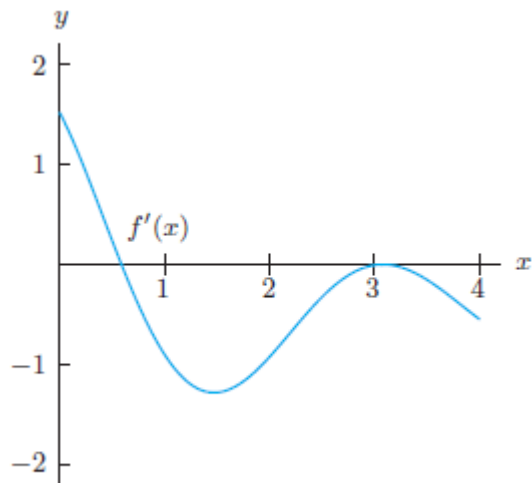


Figure 4.2

- ☐ The derivative is zero at two values of x , both being local maxima.
- ☐ The derivative is zero at two values of x , one is a local maximum, while the other is a local minimum.
- ☐ The derivative is zero at two values of x , one is a local maximum on the interval, while the other is neither a local maximum nor a minimum.
- ☐ The derivative is zero at two values of x , one is a local minimum on the interval, while the other is neither a local maximum nor a minimum.
- ☐ The derivative is zero only at one value of x , where it is a local minimum.

Problem 5 (5 pts). Find all local maxima and minima of $f(x) = 2x^3 + 3x^2 - 180x + 9$.

Problem 6 (5 pts). Find the global maximum and the global minimum of $f(x) = 2x^3 - 9x^2$ over the interval $-1 \leq x \leq 6$.

$$f'(x) =$$

Problem 8 (5 pts each). Compute the antiderivative of the following functions:

$$\int x^5(5 - 3x^6)^{12} dx =$$

$$\int 6xe^{x^2} dx =$$

$$\int \frac{3x^2}{(8x^3 - 5)^3} dx =$$

$$\int \frac{dx}{x - 4} =$$

$$\int 3x^2 4^{5x^3} dx =$$

Problem 9 (5 pts). At a price of \$80 for a half-day trip, a white-water rafting company attracts 300 customers. Every \$5 decrease in price attracts an additional 30 customers. What price should the company charge per trip to maximize revenue?

Problem 10 (5 pts). The marginal cost of drilling an oil well depends on the depth at which you are drilling; drilling becomes more expensive, per meter, as you dig deeper into the earth. The fixed costs are one million dollars and, if x is the depth in meters, the marginal costs are $MC(x) = 500 + 12x$ dollars per meter. Find the **total cost** of drilling a 400-meter well.