

1. Find the absolute maximum of the function  $f(x) = x^5 - x^4$  on the interval  $-1 \leq x \leq 1$ .  
A) 0  
B) 1  
C) -1  
D) -2
  
2. Find all the critical points of the function  $f(x) = 2x^2 - 8x + 7$ .  
A) -7  
B)  $-\frac{7}{2}$   
C) 2  
D) none
  
3. Find the intervals of increase and decrease for  $f(x) = 4x^3 + 18x^2 - 120x - 4$ .  
A) increasing on  $x \leq -5$  and  $x \geq 2$ , decreasing on  $-5 \leq x \leq 2$   
B) increasing on  $x < -5$  and  $x > 2$ , decreasing on  $-5 < x < 2$   
C) increasing on  $-5 < x < 2$ , decreasing on  $x < -5$  and  $x > 2$   
D) increasing on  $x < -2$  and  $x > 5$ , decreasing on  $-2 < x < 5$
  
4. Find all the critical points of the function  $f(x) = 4x^2 - 6x + 1$   
A) -1  
B) 0.75  
C)  $-1/4$   
D) none
  
5. Determine the critical points of the given function and classify each critical point as a relative maximum, a relative minimum, or neither.  $f(x) = \frac{5}{x^2 - 8x + 12}$   
A) (4, -1.25) relative maximum;  $x = 6$  neither;  $x = 2$  neither,  
B) (4, -1.25) relative minimum; (6, 5) relative maximum; (2, 5) relative maximum;  
C) (6, 5) relative maximum; (2, 5) relative maximum  
D) (6, 5) relative minimum; (2, 5) relative maximum

6. The cost of producing  $x$  units of a certain commodity is  $C(x) = 1x^2 + 4x + 7$  dollars. If the price is  $p(x) = (49 - x)$  dollars per unit, determine the level of production that maximizes profit.
- A)  $x = 2$
  - B)  $x = 5$
  - C)  $x = 7$
  - D)  $x = 11$
7. Let  $f(x) = 2x^3 - 3x^2 - 12x + 13$ . Find all critical points of  $f$  and use the second derivative test to classify each as a relative maximum, a relative minimum, or neither.
8. The owner of a novelty store can obtain joy buzzers from the manufacturer for 40 cents apiece. He estimates he can sell 60 buzzers when he charges \$1.4 apiece for them and that he will be able to sell 14 more buzzers for every 12 cent decrease in price. What price should he charge in order to maximize profit?
- A) \$1.06
  - B) \$1.16
  - C) \$0.96
  - D) \$1.26
9. True or false: If the demand for a commodity is  $D(p) = 28 - 5p$ , where  $p$  is the price, and the total cost is  $C(p) = p^2 + 4p$ , the maximum profit is \$24.
10. The personnel manager of a department store estimates that if she hires  $n$  temporary salespersons for the holiday season, the total net revenue derived from their efforts will be  $R(n) = -3n^4 + 40n^3 - 126n^2 + 15$  hundred dollars for  $0 \leq n \leq 10$ . How many salespersons should be hired in order to maximize total net revenue?
- A) 3
  - B) 7
  - C) 10
  - D) 0
11. How much money should be invested today at an annual interest rate of 6% compounded continuously so that 10 years from now it will be worth \$19000?
- A) \$ 17893.53
  - B) \$ 10609.5
  - C) \$ 34620.26
  - D) \$ 10427.42

12. Find  $f(3)$  if  $f(x) = e^{kx}$  and  $f(1) = 7$ .

- A) 343
- B) 2187
- C)  $\frac{1}{2187}$
- D)  $\frac{1}{343}$

13. True or false: Some amount of money is to be invested today at 7% compounded continuously so that 10 years from now the account will be worth \$5,000. The amount is \$2,000.

## Answer Key

1. A
2. C
3. B
4. B
5. A
6. B
7. maximum at  $(-1, 20)$ ; minimum at  $(2, -7)$
8. B
9. True
10. B
11. D
12. A
13. False