

1. Find the indicated composite function $f(x + 9)$ where $f(x) = \frac{1}{x}$.
 - A) $\frac{1}{x+9}$
 - B) $\frac{1}{x} + 9$
 - C) $x + 9 + 1/x$
 - D) $1 + \frac{3}{x}$

2. Find the points of intersection (if any) of the given pair of curves: $y = x^2$ and $y = 10x + 3$.
 - A) (0,0)
 - B) There are no points of intersection.
 - C) (27, 729), (-17, 289)
 - D) (33, 1,089), (-23, 529)

3. A travel agency at Enormous State U. is planning a trip package to a New Year's Day Bowl game. They've reserved space for 60 fans, and find that at a cost of \$1,800 they'll be able to sell all 60 trips. For each extra \$100 in cost, they'll lose 2 customers. What price should they charge to maximize their revenue? (Hint: Write a function describing revenue in terms of price, then find the vertex).
 - A) \$1,800
 - B) \$2,000
 - C) \$2,400
 - D) \$2,700

4. The cost of renting a backhoe at one distributor is \$325, plus \$45 per day. Write a linear function $C(x)$ that describes the cost of renting the backhoe for x days, then use your function to find how much it would cost to rent it for 10 days.
 - A) $C(x) = 325x + 45$; \$3,295
 - B) $C(x) = 10 \cdot 325 + 45x$; \$7,750
 - C) $C(x) = 325 + 45x$; \$775
 - D) $C(x) = 45x + 315$; \$765

5. Two car rental agencies are competing. One agency rents cars for 40 dollars per day and 30 cents a mile; the other agency rents cars for 25 dollars per day and 50 cents a mile. For a 5 day trip, how many miles must you travel to have the total cost be the same with each agency?
- A) 375.00 miles
 B) 75.00 miles
 C) 50.00 miles
 D) 30.00 miles
6. Find the limit: $\lim_{x \rightarrow -2} \frac{x+2}{x^2-4}$
- A) Does not exist
 B) 0
 C) $-\frac{1}{4}$
 D) -4
7. Determine all points of discontinuity for $f(x) = \frac{2x+1}{x^2+x}$.
- A) -1
 B) 0 and -1
 C) $-\frac{1}{2}$
 D) None
8. Write and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for $f(x) = \frac{5}{x^2}$, then evaluate the limit as h approaches zero.
- A) -5; -5
 B) $\frac{10x+5h}{x^2(x+h)^2}$; $\frac{10}{x^3}$
 C) $\frac{-10x-5h^2}{x^2(x+h)^2}$; $\frac{10}{x^3}$
 D) $\frac{-10x-5h}{x^2(x+h)^2}$; $-\frac{10}{x^3}$

9. Differentiate $f(x) = \frac{x^2}{x-2}$

A) $\frac{x^2 - 4x}{(x-2)^2}$

B) $\frac{x^2 + 4x}{(x-2)^2}$

C) $2x$

D) $-x$

10. Find the second derivative of the given function and simplify your answer: $f(t) = \frac{4}{6t+3}$

A) $f''(t) = \frac{288}{(6t+3)^3}$

B) $f''(t) = -\frac{288}{(6t+3)^3}$

C) $f''(t) = \frac{144}{6t+3}$

D) $f''(t) = -\frac{144}{6t+3}$

11. What is the rate of change of $f(t) = \frac{6t-9}{t+9}$ with respect to t when $t = 54$?

A) $\frac{1}{63}$

B) $-\frac{1}{63}$

C) 63

D) -63

12. When a certain commodity is sold for p dollars per unit, consumers will buy

$D(p) = \frac{31,500}{p}$ units per month. It is estimated that t months from now, the price of the

commodity will be $p(t) = t^{2/3} + 5.15$ dollars per unit. The approximate rate at which the monthly demand will be changing with respect to time in 27 months is

A) -355

B) 35

C) $-31.5.5$

D) $-131.5.5$

13. Find an equation for the tangent line to the curve $y=(7x^2+x-1)^3$ at the point where $x = 0$.
- A) $y = 14x + 1$
 B) $y = 24x + 3$
 C) $y = 3x + 1$
 D) $y = 3x-1$
14. (IMPLICIT DIFFERENTIATION) The output at a certain plant is $Q=0.06x^2+0.15xy+0.05y^2$ units per day, where x is the number of hours of skilled labor used and y is the number of hours of unskilled labor used. Currently 60 hours of skilled labor and 150 hours of unskilled labor are used each day. Use calculus to estimate the change in unskilled labor that should be made to offset a 1 hour increase in skilled labor so that output will remain the same.
- A) + 1.24.4 hours
 B) -1.24.4 hours
 C) it cannot be determined
 D) no change
15. Find all the critical points of the function $f(x)=x^3-12x-5$.
- A) none
 B) -2, 2
 C) 0, -2, 2
 D) $3\sqrt{-5}$
16. Find the intervals of increase and decrease for the function $f(x)=x^2+5x-3$.
- A) decreasing for $x < -\frac{5}{2}$; increasing for $x > -\frac{5}{2}$
 B) decreasing for $x > -\frac{5}{2}$; increasing for $x < -\frac{5}{2}$
 C) decreasing for all x
 D) increasing for all x

Answer Key

1. A
2. D
3. C
4. C
5. A
6. C
7. B
8. D
9. A
10. A
11. A
12. A
13. D
14. B
15. B
16. A