1. Find the composite function $f(2x\text{-}3)$, where $f(x) = \frac{1}{x} - x$ .

2. At a certain factory, the total cost of manufacturing $q$ units during the daily production run is $C(q) = q^2 + 2q + 297$ dollars. On a typical workday, $q(t) = 17t$ units are manufactured during the first $t$ hours of a production run. How many dollars are spent during the first 3 hours of production?

3. True or false: The graphs of $y = \frac{1}{x}$ and $y = x$ intersect at (1, 1) only.

4. Write an equation for the line through (3, 0) with slope 2.

A) $y = 2x\text{-}6$
B) $y = 2x\text{-}3$
C) $y = 2x + 6$
D) $y = 2x + 3$

5. Since the beginning of the year, the price of a carton of eggs has been rising at a constant rate of 1.5 cents per month. By May 1, the price had reached 90 cents per carton. Express the price of eggs as a function of time and determine the price at the beginning of the year.

6. A company makes a certain product for $4 each and sells it for $8. If the company has overhead expenses of $10,000 per year, how many of its products must be made and sold to break even?

A) 10,000
B) 20,000
C) 40,000
D) 2,500

7. A manufacturer's total cost consists of a fixed overhead of 300 plus production costs of 30 per unit. Express the total cost in dollars as a function of the number of units produced.

8. Find the limit: $\lim_{x\to 2} \frac{x+2}{x^2-4}$

A) 0
B) -2
C) does not exist
D) -1

9. For which value of $x$ is the following function not continuous: $f(x)=\begin{cases} x-2 & \text{if } x<2 \\ 1 & \text{if } x=2 \\ 2-x & \text{if } x>2 \end{cases}$

A) 1
B) 2
C) 0
D) -2

10. Find the limit as $x \to 4^-$ of $f(x)$ where $f(x)=\begin{cases} x^2 & \text{if } x\le 4 \\ x+3 & \text{if } x>4 \end{cases}$

11. The derivative of $f(t)=\frac{1}{t^2}$ is

A) $-\frac{2}{t}$
B) $-\frac{2}{t^3}$
C) $\frac{2}{t}$
D) $\frac{1}{t^3}$

12. The equation of the line tangent to the graph of $f(x)=x^2+3x$ at $x$ = 2 is

A) $y$ = 7$x$-4
B) $y$ = 7$x$-422
C) $y$ = 7$x$-2
D) $y$ = 7$x$-144

13. True or false: The tangent to the graph of $f(x)=\sqrt{x}+3$ at $x$ = 2 has slope of $\frac{1}{2}$ .

14. Differentiate $f(x) = x^8 + 2$

A) $8x^7 + 2$
B) $8x^9 + 2x$
C) $8x^7$
D) $7x^7$

15. Differentiate: $f(x) = x^9 + 5$

A) $9x^8$
B) $9x^8 + 5$
C) $9x^{10} + 5x$
D) $8x^8$

16. Differentiate: $f(x) = \sqrt[7]{x} - \frac{1}{\sqrt{x}}$ .

17. True or false: Differentiating $f(x) = x^2 - 5x + 1$ gives $2x^1$ .

18. What is the rate of change of $f(t) = \dfrac{2t-9}{t+4}$ with respect to $t$ when $t$ = 13?

A) $\dfrac{1}{17}$
B) $-\dfrac{1}{17}$
C) 17
D) -17

19. When toasters are sold for $p$ dollars apiece, local consumers will buy $D(p) = \dfrac{57,600}{p}$ toasters a month. It is estimated that $t$ months from now, the price of the toasters will be $p(t) = 0.03t^{3/2} + 22.08$ dollars. Compute the rate at which the monthly demand for the toasters will be changing with respect to time 16 months from now.

20. An efficiency study of the morning shift at a certain factory indicates that an average worker arriving on the job at 8:00 A.M. will have assembled $f(x) = -x^3 + 9x^2 - 3x$ transistor radios $x$ hours later. Approximately how many radios will the worker assemble between 9:00 and 9:30 A.M.?

A) approximately 12 radios
B) approximately 360 radios
C) approximately 6 radios
D) approximately 5 radios

21. Find $\frac{dy}{dx}$ , where $(x-3y)^3 = y+5$ .