Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

1) By the definition of a derivative, the derivative of $f(x) = \sqrt{x}$ is 1) _____

A) $\lim_{h \to 0} \frac{\sqrt{x+h}}{h}$.

B) $\lim_{h \to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$.

C) $\lim_{h \to 0} \frac{\left[\sqrt{x} + \sqrt{h}\right] - \sqrt{x}}{h}$.

D) $\lim_{h \to 0} \frac{\sqrt{x}+h}{h}$.

E) $\lim_{h \to 0} \frac{\left[\sqrt{x} + h - \sqrt{x}\right]}{h}$.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

2) By using the definition of a derivative, find $f'(x)$ where $f(x) = \frac{2}{3x+5}$. 2) _____

3) Find the slope of the tangent line to the curve $y = \sqrt{x+2}$ at the point $(0, \sqrt{2})$. 3) _____

4) Find y' if $y = 4x^3 - 6x^2 + 7x - 8$. 4) _____

5) Find y' if $y = \frac{7}{3}(9x + 3)$. 5) _____

6) Find y' if $y = \frac{1}{4} - \frac{x}{2}$. 6) _____

7) Find y' if $y = \frac{3}{4}x^{4/3} - \frac{1}{5}x^{1/4} + x^{-5/6}$. 7) _____

8) Find y' if $y = x^{-2} - \sqrt{x} + x^{-4/7}$. 8) _____

9) Find y' if $y = \frac{1}{2} - \frac{1}{2x}$. 9) _____

10) Find y' if $y = \sqrt{x}(x + 2)$. 10) _____

11) Find y' if $y = \dfrac{x^2 + 2x + 3}{\sqrt{x}}$. 11) _____

12) Let $f(x) = 4x^2 - 3x + 1$. 12) _____
(a) Find $f'(x)$.
(b) Evaluate $f'(1)$.
(c) Find an equation of the tangent line to the graph of $y = f(x)$ at the point (1, 2).

13) Let $f(x) = 2x^2 - 6x + 7$. 13) _____
(a) Find $f'(x)$.
(b) Evaluate $f'(2)$.
(c) Find an equation of the tangent line to the graph of $y = f(x)$ at the point (2, 3).

14) Find all values of x for which the curve $y = x^3 + x^2$ has slope 1. 14) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

15) An equation of the tangent line to the curve $y = 4x^2 - 6x - 5$ at the point $(-1, 5)$ is 15) _____
A) $y = (8x - 6)(x - 1) + 5$.
B) $y = -14x - 9$.
C) $y = 14x + 71$.
D) $y = -14x + 19$.
E) $y = 8x - 6$.

16) If $y = 2^2 + x$, then $\dfrac{dy}{dx} =$ 16) _____

A) 1. B) 5. C) 9.7. D) 2^2. E) 0.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

17) Find y' if $y = \sqrt[5]{x}\left(\sqrt[3]{x^2}\right)$ 17) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

18) A value of x for which the slope of the curve $y = \dfrac{x^3}{3} - \dfrac{3x^2}{2} + 2x + 1$ is zero is 18) _____

A) 3. B) -1. C) 2. D) 0. E) -2.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

19) Find the rate of change of $y = x(x^2 + 9x + 3)$ with respect to x. 19) _____

20) Suppose that the equation $r = 430q - 2q^2$ gives the total revenue r (in dollars) that a manufacturer receives when q units of a product are sold. Determine the marginal revenue when $q = 100$ and interpret your result. 20) _____

21) Find the rate of change of y with respect to x when $y = 7 - 3x + 11x^3$. 21) _____

22) Find y' if $y = (x^3 - 10x + 2)(x^2 + 7x + 1)$. 22) _____

23) Find y' if $y = \frac{2x + 3}{7 - 5x}$. 23) _____

24) Find y' if $y = \frac{x^2 + 1.}{2x^3 - 1}$. 24) _____

25) Find the slope of the curve $y = \frac{4x}{x + 2}$ at the point where $x = 3$. 25) _____

26) Find the slope of the curve $y = \frac{2x + 5}{x - 3}$ at the point (4, 13). 26) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

27) If $f(x) = \frac{x^2 + 4}{x^2 - 2}$, then $f'(x) =$ 27) _____

A) $\frac{12x}{(x^2 + 2)^2}$

B) 1

C) $\frac{6}{(x^2 - 2)^2}$

D) $\frac{4x + 26x - 9x^2}{(3x + 2)^2}$

E) $-\frac{12x}{(x^2 - 2)^2}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

28) 28) _____

Find the derivative of $y = \frac{\frac{1}{x} - \frac{7x}{x^2+1}}{\frac{2}{x} - \frac{3x}{x^2 + 1}}$.

29) Differentiate: $f(x) = (3x^2 + x)(8x - 7)$ 29) _____

30) Differentiate: $h(x) = (4x - 5)\sqrt{x}$ 30) _____

31) Differentiate: $g(x) = (x - 8)(2x - 7)(x + 5)$ 31) _____

32) Differentiate: $g(x) = \frac{3\sqrt{x}}{x + 4}$ 32) _____

33) Differentiate: $f(x) = \dfrac{3x^2 + 6}{5x^2 - 2x}$ 33) _____

1) B

2) $-\frac{6}{(3x+5)^2}$

3) $\frac{1}{2\sqrt{2}}$

4) $12x^2 - 12x + 7$

5) 21

6) $-\frac{1}{2}$

7) $x^{1/3} - \frac{1}{20}x^{-3/4} - \frac{5}{6}x^{-11/6}$

8) $-2x^{-3} - \frac{1}{2\sqrt{x}} - \frac{4}{7}x^{-11/7}$

9) $\frac{1}{2x^2}$

10) $\frac{3}{2}x^{1/2} + \frac{1}{x^{1/2}}$

11) $\frac{3}{2}x^{1/2} + x^{-1/2} - \frac{3}{2}x^{-3/2}$

12) (a) $8x - 3$ (b) 5 (c) $y = 5x - 3$

13) (a) $4x - 6$ (b) 2 (c) $y = 2x - 1$

14) $-1, \frac{1}{3}$

15) B

16) A

17) $\frac{13}{15}x^{-2/15}$

18) C

19) $3x^2 + 18x + 3$

20) 30; if the number of units sold increases from 100 to 101, then the total revenue increases by approximately $30.

21) $33x^2 - 3$

22) $(x^3 - 10x + 2)(2x + 7) + (x^2 + 7x + 1)(3x^2 - 10) = 5x^4 + 28x^3 - 27x^2 - 136x + 14$

23) $\frac{29}{(7 - 5x)^2}$

24) $\frac{-2x(x^3 + 3x + 1)}{(2x^3 - 1)^2}$

25) $\frac{8}{25}$

26) -11

27) E

28) $\frac{-22x}{(2 - x^2)^2}$

29) $f'(x) = 8(3x^2 + x) + (8x - 7)(6x + 1)$ or
$f'(x) = 72x^2 - 26x - 7$

30) $h'(x) = \frac{4x - 5}{2\sqrt{x}} + 4\sqrt{x}$ or

$h'(x) = \frac{12x - 5}{2\sqrt{x}}$

31) $g'(x) = (2x - 7)(x + 5) + 2(x - 8)(x + 5) + (x - 8)(2x - 7)$ or

$g'(x) = 8x^3 - 252x^2 + 104x + 28$

32) $g'(x) = \frac{\frac{3(x + 4)}{2\sqrt{x}} - 3\sqrt{x}}{(x + 4)^2}$ or

$g'(x) = \frac{-3x + 12}{2\sqrt{x}(x + 4)^2}$

33) $f'(x) = \frac{6x(5x^2 - 2x) - (3x^2 + 6)(10x - 2)}{(5x^2 - 2x)^2}$ or

$f'(x) = \frac{20x^3 - 6x^2 - 60x + 12}{(5x^2 - 2x)^2}$