1. (1 pt) If $f(x) = 2x^2 - 4x - 15$, find $f'(x)$.

_____

Answer(s) submitted:

- 4(x-1)

(correct)

2. (1 pt) Let $f(x) = 4x^8 - 5x^5 - 2x^3 + 3x$, find $f'(x)$.

Answer: _____

Find $f'(4)$.

Answer: _____

Answer(s) submitted:

- 32x^7-25x^4-6x^2+3
- 517795

(correct)

3. (1 pt) If $f(t) = 3\sin t - 4\pi \cos t$, find $f'(t)$

_____

Answer(s) submitted:

- 4pisin(t) + 3cos(t)

(correct)

4. (1 pt) If
$$f(t) = \frac{\sqrt{4}}{t^7},$$
find $f'(t)$.

_____

Find $f'(5)$.

_____

Answer(s) submitted:

- -14/t^8
- -14/390625

(correct)

5. (1 pt) If $f(x) = 6 + \frac{2}{x} + \frac{7}{x^2}$, find $f'(x)$.

_____

Answer(s) submitted:

- -(2(x+7) / x^3)

(correct)

6. (1 pt) If $f(x) = (x-7)(9x+5)$, then

$f'(x) = $ _____

Answer(s) submitted:

- 18x-58

(correct)

7. (1 pt) If $f(t) = 3t^{-5/3}$, find $f'(t)$.
$f'(t) = $ _____

Answer(s) submitted:

- -5/t^(8/3)

(correct)

8. (1 pt)
Differentiate the following function:
$$V(r) = \frac{4}{3}\pi r^3$$
$V'(r) = $ _____
Answer(s) submitted:

- 4pir^2

(correct)

9. (1 pt) If $f(x) = 15\sqrt{x}(x-5)$, find $f'(x)$.
$f'(x) = $ _____

Answer(s) submitted:

- 15(3x-5)/(2sqrt(x))

(correct)

10. (1 pt) If $f(x) = 6\sqrt{x}(x^3 - 3\sqrt{x} + 6)$, find $f'(x)$.

_____

Find $f'(3)$.

_____

Answer(s) submitted:

- 3((7x^(5/2)) + (6/sqrt(x)) - 6)

- 319.75

(correct)

11. (1 pt) If $y = 4\pi^7$, find y'.

_____

Answer(s) submitted:
- 0

(correct)

12. (1 pt) If $f(u) = \sqrt{1}\,u + \sqrt{8u}$, find $f'(u)$

_____

Answer(s) submitted:
- (sqrt(2)/sqrt(u)) + 1

(correct)

13. (1 pt) If $f(x) = \frac{7x^2+8x+25}{\sqrt{x}}$, find $f'(x)$.

$f'(x) = $ _____

Answer(s) submitted:
- ((x(21x + 8) - 25) / (2x^(3/2)))

(correct)

14. (1 pt) If $f(x) = \frac{-5x^5+5x^4-7x^3}{x^4}$, find $f'(x)$.

_____

Answer(s) submitted:
- ((7/x^2) - 5)

(correct)

15. (1 pt) If $f(t) = 3\sqrt{t} + \frac{7}{\sqrt{t}}$, find $f'(t)$.

$f'(t) = $ _____

Answer(s) submitted:
- ((3t-7)/(2t^(3/2)))

(correct)

16. (1 pt)

Let $f(x) = -7x^6\sqrt{x} + \frac{6}{x^3\sqrt{x}}$.

$f'(x) = $ _____

[NOTE: Your answer should be a function in terms of the variable 'x' and not a number!]

Answer(s) submitted:
- -(7(13x^10 + 6) / (2x^(9/2)))

(correct)

17. (1 pt) If $f(t) = \frac{\sin t}{3} + \frac{4}{t}$, then

$f'(t) = $ _____

Answer(s) submitted:
- (cos(t)/3) - (4/t^2)

(correct)

18. (1 pt) If $f(t) = \sqrt[3]{t^2} + 2\sqrt{t^3}$, find $f'(t)$.
$f'(t) = $ _____

Answer(s) submitted:
- (9t^(3/2) + 2t^(2/3))/(3t)

(correct)

19. (1 pt)
Find the equation of the tangent line to the curve $y = 6\sin x$ at the point $(\pi/6, 3)$.
The equation of this tangent line can be written in the form $y = mx + b$ where
$m = $ _____
and $b = $ _____
Answer(s) submitted:
- 3sqrt(3)
- -((sqrt(3)pi)/2) + 3

(correct)

20. (1 pt) Find the equation of the tangent line and normal line to the curve $y = (3+5x)^2$ at the point $(4,529)$. Write the equations of the lines in the form $y = mx + b$.

Tangent line: $y = $ _____
Normal line: $y = $ _____
Answer(s) submitted:
- 230x-391
- (-x/230) + 529.02

(correct)

21. (1 pt) Find the first and second derivative of the function.

$$f(x) = 6\sin x + 10\cos x.$$

$f'(x) = $ _____

$f''(x) = $ _____

Answer(s) submitted:
- 6cos(x) - 10sin(x)
- -2(3sin(x) + 5cos(x))

(correct)

22. (1 pt) Find the points on the graph of $f(x) = 2x^3 + 12x^2 - 72x + 18$ where the tangent is horizontal. List the x-values of these points. (Separate answers by commas if there are more than one.)

x value(s) = _____

Answer(s) submitted:

- -6, 2

(correct)

23. (1 pt) For what value(s) of x is the tangent line of the graph of

$$f(x) = 8x^3 - 12x^2 - 143x - 24$$

parallel to the line $y = x - 1.1$?

If there is more than one value of x, list them as a comma separated list.

_____

Answer(s) submitted:

- -2, 3

(correct)

24. (1 pt) At what point does the normal to $y = 4 - 3x + 4x^2$ at $(1, 5)$ intersect the parabola a second time?

(_____ , _____)

The normal line is perpendicular to the tangent line. If two lines are perpendicular their slopes are negative reciprocals – i.e. if the slope of the first line is m then the slope of the second line is $-1/m$

Answer(s) submitted:

- -0.3
- 5.26

(correct)

25. (1 pt) Suppose that the equation of motion for a particle (where s is in meters and t in seconds) is

$$s = (1/3)t^3 - 2t^2 + 4t + 5$$

.

(a) Find the velocity and acceleration as functions of t.

Velocity at time t = _____

Acceleration at time t = _____

(b) Find the acceleration after 1 second.

Acceleration after 1 second: _____

(c) Find the acceleration at the instant when the velocity is 0.

Acceleration: _____

Answer(s) submitted:

- (t-2)^2
- 2(t-2)
- -2
- 0

(correct)

26. (1 pt) A particle moves along a straight line and its position at time t is given by $s(t) = t^4 - 12t + 21$, $t \geq 0$. where s is measured in feet and t in seconds.

(A) Find the velocity at time t: _____

(B) Find the velocity (in ft/sec) of the particle at time $t = 3$. _____

(C) Find all values of t for which the particle is at rest. (If there are no such values, enter *none* . If there are more than one value, list them separated by commas.)

$t =$ _____

(D) Use interval notation to indicate when the particle is moving in the positive direction. (If needed, enter *inf* for ∞. If the particle is never moving in the positive direction, enter *none* .)

_____

(E) Find the total distance traveled during the first 8 seconds.

_____

Answer(s) submitted:

- 4(t^3-3)
- 96
- 3^(1/3)
- (3^(1/3),Inf)
- 4024

(correct)

27. (1 pt) If a ball is thrown vertically upward from the roof of 48 foot building with a velocity of 64 ft/sec, its height after t seconds is $s(t) = 48 + 64t - 16t^2$.

a.) What is the maximum height the ball reaches?

Answer: _____

b.) What is the velocity of the ball when it hits the ground (height 0)?

Answer: _____

Answer(s) submitted:

- 112
- -84.66

(correct)

28. (1 pt) A spherical balloon is being inflated. Find the rate of increase (with respect to the radius r) of the surface area $(S = 4\pi r^2)$ when:

(A) $r = 2$ inches $\rightarrow$ Rate of increase = _____
(B) $r = 4$ inches $\rightarrow$ Rate of increase = _____
(C) $r = 5$ inches $\rightarrow$ Rate of increase = _____

Answer(s) submitted:

- 16pi
- 32pi
- 40pi

(correct)