

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

Answer(s) submitted:

- $4(x-1)$

(correct)

Correct Answers:

- $2*2*x-4$

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)

Correct Answers:

- $4*8*x^7 - 5*5*x^4 - 2*3*x^2 + 3$
- $4*8*4^7 - (5*5*4^4) - (2*3*4^2) + 3$

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

Answer(s) submitted:

- $4\pi\sin(t) + 3\cos(t)$

(correct)

Correct Answers:

- $3*\cos(t) + 4*3.14159265358979*\sin(t)$

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)

Correct Answers:

- $(\sqrt{4}) * (-7) * t^{*-7-1}$
- $-3.584E-05$

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)

Correct Answers:

- $-2*x^{*-2} - 2*7*x^{*-3}$

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

$f'(x) =$  \_\_\_\_\_

Answer(s) submitted:

- $18x-58$

(correct)

Correct Answers:

- $2*9*x + 5 - 7*9$

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

$f'(t) =$  \_\_\_\_\_

Answer(s) submitted:

- $-5/t^{(8/3)}$

(correct)

Correct Answers:

- $(-5) * (t^{*(-5/3-1)})$

8. (1 pt)

Differentiate the following function:

$$V(r) = \frac{4}{3}\pi r^3$$

$V'(r) =$  \_\_\_\_\_

Answer(s) submitted:

- $4\pi r^2$

(correct)

Correct Answers:

- $(4 * \pi * r^2)$

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

Answer(s) submitted:

- $15(3x-5)/(2\sqrt{x})$

(correct)

Correct Answers:

- $(15) * (3/2) * (x^{**}(1/2)) - (15) * (5/2) * (x^{**}(-1/2))$

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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)

Correct Answers:

- $3.5*6*x^{**2.5} - 6*3 + .5*6*6*x^{**}(-.5)$
- 319.749907475931

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

Answer(s) submitted:

- 0

(correct)

Correct Answers:

- 0

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

Answer(s) submitted:

- $(\sqrt{x}(2)/\sqrt{x}(u)) + 1$

(correct)

Correct Answers:

- $\sqrt{x}(1)+\sqrt{x}(8)/(2*\sqrt{x}(u))$

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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)

Correct Answers:

- $(7) * (3/2) * (x^{**}(1/2)) + (8/2) * (x^{**}(-1/2)) - (25/2) * (x^{**}(-3/2))$

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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)

Correct Answers:

- $-5 - -7/x^2$

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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)

Correct Answers:

- $(3/2) * (t^{**}(-1/2)) - (1/2) * (7) * (t^{**}(-3/2))$

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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)

Correct Answers:

- $-7*(6 + 1/2)*x^{**}(6 - 1/2) - 6*(3 + 1/2)/x^{**}(3+3/2)$

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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)

Correct Answers:

- $\cos(t)/3 - 4/t^2$

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)

Correct Answers:

- $(2/3) * (t^{(-1/3)}) + (3) * (t^{(1/2)})$

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:

- $3\sqrt{3}$
- $-((\sqrt{3})\pi)/2 + 3$

(correct)

Correct Answers:

- 5.19615242270663
- 0.279300956757525

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)

Correct Answers:

- $230 * (x - 4) + 529$
- $-(x - 4) / 230 + 529$

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:

- $6\cos(x) - 10\sin(x)$
- $-2(3\sin(x) + 5\cos(x))$

(correct)

Correct Answers:

- $6*\cos(x) - 10*\sin(x)$

- $-6*\sin(x) - 10*\cos(x)$

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)

Correct Answers:

- -6, 2

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)

Correct Answers:

- -2, 3

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)

Correct Answers:

- -0.3
- 5.26

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)

Correct Answers:

- $3 \cdot (0.3333333333333333) \cdot (t^2) - 2 \cdot (2) \cdot t + 4$
- $6 \cdot 0.3333333333333333 \cdot t - 2 \cdot 2$
- $-2$
- $0$

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  $\infty$ . 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
- $3^{(1/3)}$
- $(3^{(1/3)}, \text{Inf})$
- 4024

(correct)

Correct Answers:

- $4 \cdot t^{**3} - 12$
- 96
- 1.44224957030741
- $(1.44224957030741, \text{infinity})$
- 4025.96049226553

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)

Correct Answers:

- $48 + 64 \cdot 4/2 - 4 \cdot 4^2$
- $-16 \cdot (4 \cdot 4 + 4 \cdot 3)^{.5}$

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)

Correct Answers:

- 50.2654832
- 100.5309664
- 125.663708