Student: ____________ Date: ____________	**Instructor:** Robert Brown **Course:** Calculus I Spring 2019 Math 1540 Dr. Bob Brown CRN 20506	**Assignment:** Calculus I Test 2 Practice

1. An object is dropped from the top of a cliff 625 meters high. Its height above the ground t seconds after it is dropped is $625-4.9t^2$. Determine its speed 10 seconds after it is dropped.

The speed of the object 10 seconds after it is dropped is ____________ m/sec.
(Simplify your answer.)

ID: 3.1.29

---

2. A rectangular steel plate expands as it is heated. Find the rate of change of area with respect to temperature T when the width is 1.3 cm and the length is 2.4 cm if $dl/dt = 1.4\times10^{-5}$ cm / °C and $dw/dt = 8.8\times10^{-6}$ cm / °C. Round to one decimal place.

- A. 1.2×10^{-5} cm^2/°C
- B. 3.9×10^{-5} cm^2/°C
- C. 1.8×10^{-5} cm^2/°C
- D. 3.1×10^{-5} cm^2/°C

ID: 3.1-22

---

3. Differentiate the function and find the slope of the tangent line at the given value of the independent variable.

$$f(x)=9x+\frac{4}{x},\quad x=7$$

- A. $\frac{437}{7}$
- B. $\frac{445}{7}$
- C. $\frac{445}{49}$
- D. $\frac{437}{49}$

ID: 3.2-13

---

4. Find $\frac{ds}{dt}$ if $s=\frac{t}{2t+5}$.

$\frac{ds}{dt}=$ ____________

ID: 3.2.9

---

5. Find the derivative.

$$y = \frac{1}{11x^2} + \frac{1}{7x}$$

A. $\frac{2}{11x^3} + \frac{1}{7x^2}$

B. $-\frac{1}{11x^3} + \frac{1}{7x^2}$

C. $-\frac{2}{11x^3} - \frac{1}{7x^2}$

D. $-\frac{2}{11x} - \frac{1}{7x^2}$

ID: 3.3-7

6. Find the second derivative.

$$y = \frac{1}{13x^2} + \frac{1}{9x}$$

A. $\frac{6}{13x^4} - \frac{2}{9x^3}$

B. $-\frac{2}{13x^4} + \frac{1}{9x^3}$

C. $-\frac{2}{13x^3} - \frac{1}{9x^2}$

D. $\frac{6}{13x^4} + \frac{2}{9x^3}$

ID: 3.3-14

7. Find y′.

$$y = \left(\frac{1}{x^2} + 6\right)\left(x^2 - \frac{1}{x^2} + 6\right)$$

- A. $-\frac{1}{x^5} + 12x$
- B. $\frac{4}{x^3} + 12x$
- C. $-\frac{4}{x^5} - 12x$
- D. $\frac{4}{x^5} + 12x$

ID: 3.3-20

8. Find the derivative of the function.

$$g(x) = \frac{x^2 + 5}{x^2 + 6x}$$

- A. $g'(x) = \frac{6x^2 - 10x - 30}{x^2(x+6)^2}$
- B. $g'(x) = \frac{x^4 + 6x^3 + 5x^2 + 30x}{x^2(x+6)^2}$
- C. $g'(x) = \frac{2x^3 - 5x^2 - 30x}{x^2(x+6)^2}$
- D. $g'(x) = \frac{4x^3 + 18x^2 + 10x + 30}{x^2(x+6)^2}$

ID: 3.3-23

9. Find the derivative.

$y = \sqrt[8]{x^7} + x^{7e}$

A. $\frac{7}{8}x^{1/8} + 7x^{7e-1}$

B. $\frac{7}{8}x^{1/8} + 7ex^{7e-1}$

C. $\frac{7}{8}x^{-1/8} + 7ex^{7e-1}$

D. $\frac{7}{8}x^{-1/8} + 7x^{7e-1}$

ID: 3.3-32

---

10. A ball dropped from the top of a building has a height of $s = 256 - 16t^2$ meters after t seconds. How long does it take the ball to reach the ground? What is the ball's velocity at the moment of impact?

A. 8 sec, −64 m/sec
B. 4 sec, −128 m/sec
C. 4 sec, 128 m/sec
D. 16 sec, −512 m/sec

ID: 3.4-8

---

11. The driver of a car traveling at 60 ft/sec suddenly applies the brakes. The position of the car is $s = 60t - 3t^2$, t seconds after the driver applies the brakes. How far does the car go before coming to a stop?

A. 10 ft
B. 1,200 ft
C. 300 ft
D. 600 ft

12.

The original 24 m edge length x of a cube decreases at the rate of 2 m/min.

a. When x = 2 m, at what rate does the cube's surface area change?
b. When x = 2 m, at what rate does the cube's volume change?

a. When x = 2 m, the surface area is changing at a rate of ____________ m^2/min.
(Type an integer or a decimal.)

b. When x = 2 m, the volume is changing at a rate of ____________ m^3/min.
(Type an integer or a decimal.)

13. Find the derivative.

$s = t^5 \cos t - 14t \sin t - 14 \cos t$

- A. $\frac{ds}{dt} = t^5 \sin t - 5t^4 \cos t + 14t \cos t$
- B. $\frac{ds}{dt} = -t^5 \sin t + 5t^4 \cos t - 14t \cos t$
- C. $\frac{ds}{dt} = -5t^4 \sin t - 14 \cos t + 14 \sin t$
- D. $\frac{ds}{dt} = -t^5 \sin t + 5t^4 \cos t - 14t \cos t - 28 \sin t$

ID: 3.5-4

---

14. Find $\frac{dy}{dx}$ for the following function.

$y = \frac{9 \cos x}{1 - \sin x}$

$\frac{dy}{dx} =$ ____________

ID: 3.5.12

---

15. Given $y = f(u)$ and $u = g(x)$, find $\frac{dy}{dx} = f'(g(x))g'(x)$.

$y = \sin u$, $u = \cos x$

- A. $\sin(\cos x) \sin x$
- B. $-\cos(\cos x) \sin x$
- C. $\cos x \sin x$
- D. $-\cos x \sin x$

ID: 3.6-5

16.
Write the function in the form y = f(u) and u = g(x). Then find $\frac{dy}{dx}$ as a function of x.

$y = \csc(\cot x)$

- A. $y = \csc u$; $u = \cot x$; $\frac{dy}{dx} = \csc(\cot x)\cot(\cot x)\csc^2 x$
- B. $y = \csc u$; $u = \cot x$; $\frac{dy}{dx} = -\csc(\cot x)\cot(\cot x)$
- C. $y = \cot u$; $u = \csc x$; $\frac{dy}{dx} = \csc^2(\csc x)\csc x \cot x$
- D. $y = \csc u$; $u = \cot x$; $\frac{dy}{dx} = \csc^3 x \cot x$

ID: 3.6-8

17.
Use implicit differentiation to find $\frac{dy}{dx}$.

$xy + x + y = x^2y^2$

- A. $\frac{2xy^2 - y}{2x^2y + x}$
- B. $\frac{2xy^2 + y + 1}{-2x^2y - x - 1}$
- C. $\frac{2xy^2 + y}{2x^2y - x}$
- D. $\frac{2xy^2 - y - 1}{-2x^2y + x + 1}$

ID: 3.7-5

18. Find the derivative of y with respect to x.

$y = x^4 \ln x - \frac{1}{3}x^3$

- A. $x^3 - x^2 + 4x^3 \ln x$
- B. $x^4 \ln x - x^2 + 4x^3$
- C. $4x^3 - x^2$
- D. $5x^3 - x^2$

19. Find the derivative of y with respect to x.

$y = -\sin^{-1}\left(11x^2 + 4\right)$

- A. $\dfrac{22x}{1 + \left(11x^2 + 4\right)^2}$
- B. $\dfrac{-22x}{\sqrt{1 - \left(11x^2 + 4\right)^2}}$
- C. $\dfrac{11}{\sqrt{1 + \left(11x^2 + 4\right)^2}}$
- D. $\dfrac{22x}{\sqrt{1 - \left(11x^2 + 4\right)^2}}$

20. Water is discharged from a pipeline at a velocity v (in ft/sec) given by $v = 1910p^{(1/2)}$, where p is the pressure (in psi). If the water pressure is changing at a rate of 0.178 psi / sec, find the acceleration (dv/dt) of the water when p = 37 psi. Round to three decimal places.

- A. 27.946 ft/sec^2
- B. 157.001 ft/sec^2
- C. 1034.009 ft/sec^2
- D. 58.090 ft/sec^2

21. The kinetic energy K of an object with mass m and velocity v is $K = \frac{1}{2}mv^2$. How is dm/dt related to dv/dt if K is constant?

A. $\frac{dm}{dt} = -2mv^3\frac{dv}{dt}$

B. $\frac{dm}{dt} = \frac{m}{v}\frac{dv}{dt}$

C. $\frac{dm}{dt} = -\frac{2m}{v}\frac{dv}{dt}$

D. $\frac{dv}{dt} = -\frac{2m}{v}\frac{dm}{dt}$

22. The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds. Find the body's speed and acceleration at the end of the time interval.

$s = -t^3 + 4t^2 - 4t,\ 0 \le t \le 4$

A. 20 m/sec, − 16 m/sec^2

B. 4 m/sec, 0 m/sec^2

C. − 20 m/sec, − 16 m/sec^2

D. 20 m/sec, − 4 m/sec^2

23. Electrical systems are governed by Ohm's law, which states that V = IR, where V = voltage, I = current, and R = resistance. If the current in an electrical system is decreasing at a rate of 8 A/s while the voltage remains constant at 10 V, at what rate is the resistance increasing (in Ω/sec) when the current is 28 A?

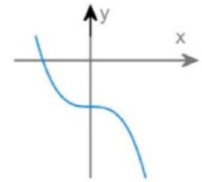
A. $\frac{7}{20}$ Ω/sec

B. $\frac{5}{49}$ Ω/sec

C. $\frac{20}{7}$ Ω/sec

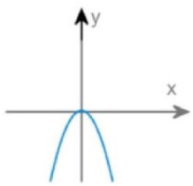
D. $\frac{160}{7}$ Ω/sec

24. Graph the derivative of the function graphed on the right.

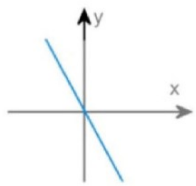


Choose the correct graph below.

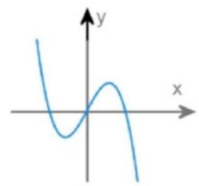
A.



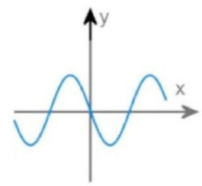
B.



C.

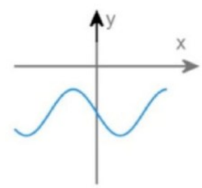


D.



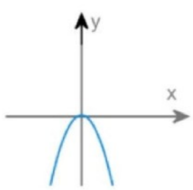
ID: 3.2.27

25. Graph the derivative of the function graphed on the right.

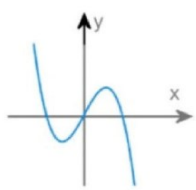


Choose the correct graph below.

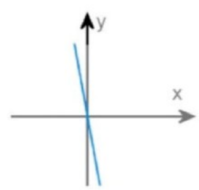
A.



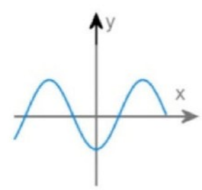
B.



C.



D.



ID: 3.2.29

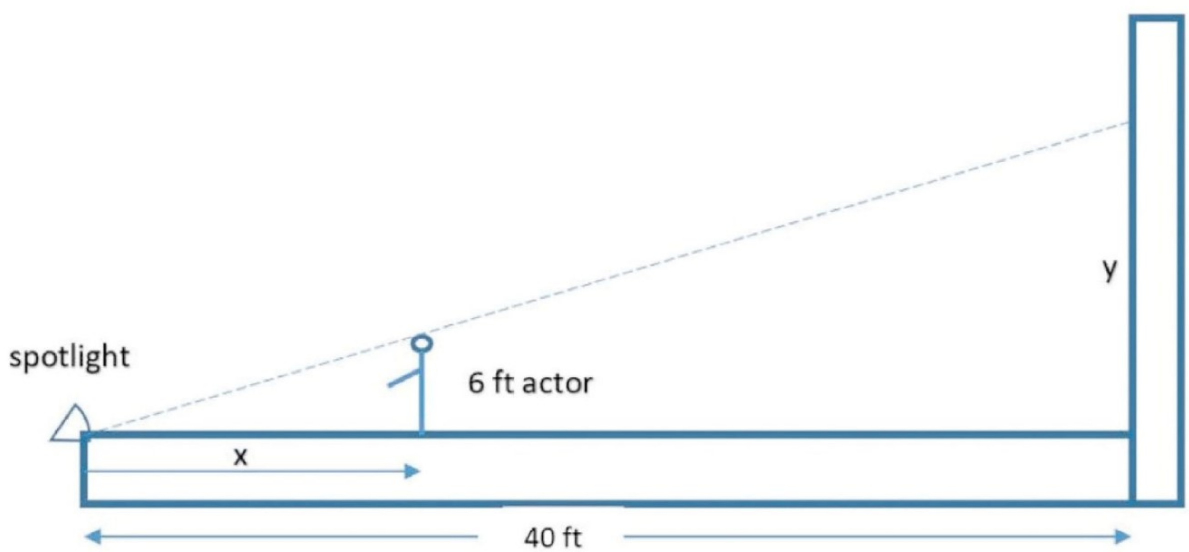
26. One of the formulas for inventory management says that the average weekly cost of ordering, paying for, and holding merchandise is $A(q) = \frac{km}{q} + cm + \frac{hq}{2}$, where q is the quantity ordered when things run low (shoes, TVs, brooms, or whatever the item might be); k is the cost of placing an order (the same, no matter how often you order); c is the cost of one item (a constant); m is the number of items sold each week (a constant); and h is the weekly holding cost per item (a constant that takes into account things such as space, utilities, insurance, and security). Find $\frac{dA}{dq}$ and $\frac{d^2A}{dq^2}$.

$\frac{dA}{dq} =$ ____________ (Type an exact answer.)

$\frac{d^2A}{dq^2} =$ ____________ (Type an exact answer.)

ID: 3.3.78

27.



An actor 6 feet tall is on a 40 foot-long stage and is walkng at a speed of 3 feet/second toward the front where a spotlight casts a shadow on the high wall behind him. How fast is the length of the shadow (y) increasing when the actor is 10 feet (x) from the front?

1. 98

---

2. B. 3.9×10^{-5} cm^2/°C

---

3. D. $\frac{437}{49}$

---

4. $\frac{5}{(2t+5)^2}$

---

5. C. $-\frac{2}{11x^3} - \frac{1}{7x^2}$

---

6. D. $\frac{6}{13x^4} + \frac{2}{9x^3}$

---

7. D. $\frac{4}{x^5} + 12x$

---

8. A. $g'(x) = \frac{6x^2 - 10x - 30}{x^2(x+6)^2}$

---

9. C. $\frac{7}{8}x^{-1/8} + 7e\,x^{7e-1}$

---

10. B. 4 sec, − 128 m/sec

---

11. C. 300 ft

---

12. -48, -24

---

13. B. $\frac{ds}{dt} = -t^5 \sin t + 5t^4 \cos t - 14t \cos t$

---

14. $\frac{9}{1 - \sin x}$

---

15. B. $-\cos(\cos x)\sin x$

---

16. A. $y = \csc u$; $u = \cot x$; $\frac{dy}{dx} = \csc(\cot x)\cot(\cot x)\csc^2 x$

---

17. D. $\frac{2xy^2 - y - 1}{-2x^2y + x + 1}$

18. A. $x^3 - x^2 + 4x^3 \ln x$

---

19. B. $\frac{-22x}{\sqrt{1-\left(11x^2+4\right)^2}}$

20. A. 27.946 ft/sec^2

---

21. C. $\frac{dm}{dt} = -\frac{2m}{v}\frac{dv}{dt}$

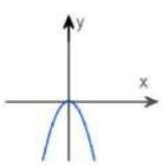
---

22. 20 m/sec, -16 m/sec

---

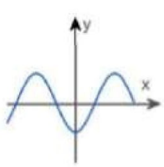
23. B. $\frac{5}{49}$ Ω/sec

24.



A.

25.



D.

26. $\frac{h}{2} - \frac{km}{q^2}$

$\frac{2km}{q^3}$

---

27. 7.2 feet/sec