Math 1540 Quiz 2 Practice Quiz Updated Spring 2013

Name: Last _____, First _____

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

Find the derivative.

1) $y = 5x^2 + 11x + 4x^{-3}$ 1) _____

A) $10x + 11 + 12x^{-4}$ B) $5x + 4x^{-4}$

C) $10x - 12x^{-4}$ D) $10x + 11 - 12x^{-4}$

Find the second derivative.

2) $y = 4x^2 + 12x + 5x^{-3}$ 2) _____

A) $8 - 60x^{-5}$ B) $8x + 12 - 15x^{-4}$ C) $8 + 60x^{-5}$ D) $8 + 60x^{-1}$

Find y′.

3) $y = (5x - 3)(5x^3 - x^2 + 1)$ 3) _____

A) $75x^3 + 60x^2 - 20x + 5$ B) $100x^3 - 60x^2 + 6x + 5$

C) $100x^3 - 20x^2 + 60x + 5$ D) $25x^3 + 20x^2 - 60x + 5$

4) $y = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$ 4) _____

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

Find the derivative of the function.

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

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

6) $y = x^8e^{-x}$ 6) _____

A) $\frac{dy}{dx} = 8x^9e^{-x} - x^8e^{-x}$ B) $\frac{dy}{dx} = 8x^7e^{-x} - x^8e^{-x}$

C) $\frac{dy}{dx} = 8x^7e^{-x} + x^8e^{-x}$ D) $\frac{dy}{dx} = 8x^9e^{-x} + x^8e^{-x}$

Find the derivative.

7) $y = 3x^2e^{-x}$ 7) _____

A) $3xe^{-x}(x + 2)$ B) $3xe^{-x}(2 - x)$ C) $6xe^{-x}(1 - x)$ D) $3xe^{x}(2 - x)$

8) $y = \sqrt[7]{x^6} + x^{6e}$ 8) _____

A) $\frac{6}{7}x^{1/7} + 6x^{6e-1}$ B) $\frac{6}{7}x^{-1/7} + 6x^{6e-1}$

C) $\frac{6}{7}x^{-1/7} + 6ex^{6e-1}$ D) $\frac{6}{7}x^{1/7} + 6ex^{6e-1}$

Find the derivative of the function.

9) $p = \left(\frac{q^8 + 4}{2q}\right)\left(\frac{q^7 + 6}{q}\right)$ 9) _____

A) $\frac{dp}{dq} = \frac{17}{2}q^{16} + 18q^8 + 30q^9 - \frac{24}{q^3}$ B) $\frac{dp}{dq} = \frac{13}{2}q^{12} - \frac{24}{q^3}$

C) $\frac{dp}{dq} = \frac{13}{2}q^{12} + 10q^4 + 18q^5 - \frac{24}{q^3}$ D) $\frac{dp}{dq} = \frac{1}{2}q^{12} + 2q^4 + 3q^5 + \frac{24}{q^3}$

Suppose u and v are differentiable functions of x. Use the given values of the functions and their derivatives to find the value of the indicated derivative.

10) $u(1) = 5$, $u'(1) = -7$, $v(1) = 6$, $v'(1) = -2$. 10) _____

$\frac{d}{dx}\left(\frac{u}{v}\right)$ at $x = 1$

A) $-\frac{8}{9}$ B) $-\frac{16}{3}$ C) $-\frac{13}{9}$ D) -8

Solve the problem.

11) Find an equation for the tangent to the curve $y = \frac{8x}{x^2 + 1}$ at the point (1, 4). 11) _____

A) $y = 0$ B) $y = x + 4$ C) $y = 4$ D) $y = 4x$

The function s = f(t) gives the position of a body moving on a coordinate line, with s in meters and t in seconds.

12) $s = 3t^2 + 3t + 3$, $0 \le t \le 2$ 12) _____

Find the body's speed and acceleration at the end of the time interval.

A) 9 m/sec, 2 m/sec^2 B) 18 m/sec, 6 m/sec^2

C) 15 m/sec, 12 m/sec^2 D) 15 m/sec, 6 m/sec^2

Solve the problem.

13) At time t, the position of a body moving along the s–axis is $s = t^3 - 27t^2 + 240t$ m. Find the body's acceleration each time the velocity is zero. 13) _____

A) $a(10) = 6$ m/sec^2, $a(8) = -6$ m/sec^2 B) $a(20) = 120$ m/sec^2, $a(16) = 20$ m/sec^2

C) $a(10) = 0$ m/sec^2, $a(8) = 0$ m/sec^2 D) $a(10) = -6$ m/sec^2, $a(8) = 6$ m/sec^2

14) At time $t \ge 0$, the velocity of a body moving along the s–axis is $v = t^2 - 8t + 7$. When is the body moving backward? 14) _____

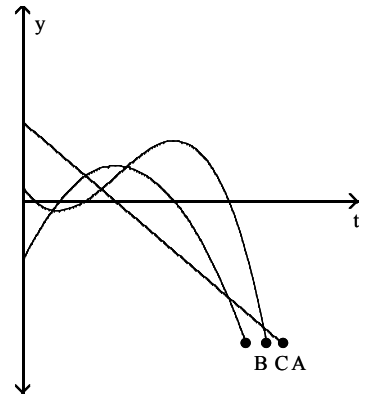
A) $0 \le t < 1$ B) $1 < t < 7$ C) $0 \le t < 7$ D) $t > 7$

15) 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? 15) _____

A) 4 sec, –128 m/sec
B) 8 sec, –64 m/sec
C) 4 sec, 128 m/sec
D) 16 sec, –512 m/sec

The graphs show the position s, velocity v = ds/dt, and acceleration $a = d^2s/dt^2$ of a body moving along a coordinate line as functions of time t. Which graph is which?

16) 16) _____



A) B = position, A = velocity, C = acceleration
B) B = position, C = velocity, A = acceleration
C) C = position, A = velocity, B = acceleration
D) C = position, B = velocity, A = acceleration

Solve the problem.

17) The driver of a car traveling at 42 ft/sec suddenly applies the brakes. The position of the car is $s = 42t - 3t^2$, t seconds after the driver applies the brakes. How many seconds after the driver applies the brakes does the car come to a stop? 17) _____

A) 42 sec
B) 7 sec
C) 21 sec
D) 14 sec

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds).

18) $s = 10 \sin t - \cos t$ 18) _____

Find the body's velocity at time $t = \pi/4$ sec.

A) $\frac{11\sqrt{2}}{2}$ m/sec
B) $-\frac{11\sqrt{2}}{2}$ m/sec
C) $\frac{9\sqrt{2}}{2}$ m/sec
D) $-\frac{9\sqrt{2}}{2}$ m/sec

Find the derivative.

19) $r = 7 - \theta^7 \cos\theta$ 19) _____

A) $\frac{dr}{d\theta} = 7\theta^6 \cos\theta - \theta^7 \sin\theta$
B) $\frac{dr}{d\theta} = 7\theta^6 \sin\theta - \theta^7 \cos\theta$
C) $\frac{dr}{d\theta} = 7\theta^6 \sin\theta$
D) $\frac{dr}{d\theta} = -7\theta^6 \cos\theta + \theta^7 \sin\theta$

20) $s = t^2 - \cos t + 4e^t$ 20) _____

A) $\frac{ds}{dt} = 2t - \sin t + 4e^t$
B) $\frac{ds}{dt} = 2t + \sin t - 4e^t$
C) $\frac{ds}{dt} = 2t + \sin t + 4e^t$
D) $\frac{ds}{dt} = t + \sin t + 4e^t$

Find the derivative of the function.

21) $q = \cos\left(\sqrt{6t + 11}\right)$ 21) _____

A) $\frac{dq}{dt} = -\sin\left(\sqrt{6t + 11}\right)$

B) $\frac{dq}{dt} = -\frac{3}{\sqrt{6t + 11}}\sin\left(\sqrt{6t + 11}\right)$

C) $\frac{dq}{dt} = -\sin\left(\frac{3}{\sqrt{6t + 11}}\right)$

D) $\frac{dq}{dt} = -\frac{1}{2\sqrt{6t + 11}}\sin\left(\sqrt{6t + 11}\right)$

22) $q = \sqrt{16r - r^5}$ 22) _____

A) $\frac{dq}{dr} = \frac{1}{2\sqrt{16 - 5r^4}}$

B) $\frac{dq}{dr} = \frac{1}{2\sqrt{16r - r^5}}$

C) $\frac{dq}{dr} = \frac{-5r^4}{\sqrt{16r - r^5}}$

D) $\frac{dq}{dr} = \frac{16 - 5r^4}{2\sqrt{16r - r^5}}$

Find dy/dx as a function of x.

23) $y = \tan\left(\pi - \frac{2}{x}\right)$ 23) _____

A) $\frac{dy}{dx} = \frac{2}{x^2}\sec^2\left(\pi - \frac{2}{x}\right)$

B) $\frac{dy}{dx} = \sec^2\left(\frac{2}{x^2}\right)$

C) $\frac{dy}{dx} = \frac{2}{x^2}\sec\left(\pi - \frac{2}{x}\right)\tan\left(\pi - \frac{2}{x}\right)$

D) $\frac{dy}{dx} = \sec^2\left(\pi - \frac{2}{x}\right)$

Find the derivative of the function.

24) $f(x) = \cos\left[(8x + 6)^{-1/2}\right]$ 24) _____

A) $f'(x) = -\sin\left[\frac{-4}{(8x + 6)^{3/2}}\right]$

B) $f'(x) = \frac{4\sin\left[(8x + 6)^{-1/2}\right]}{(8x + 6)^{3/2}}$

C) $f'(x) = \frac{-\sin\left[(8x + 6)^{-1/2}\right]}{2(8x + 6)^{3/2}}$

D) $f'(x) = -\sin\left[(8x + 6)^{-1/2}\right]$

Find the value of $(f \circ g)'$ at the given value of x.

25) $f(u) = u^2$, $u = g(x) = x^5 + 2$, $x = 0$ 25) _____

A) –30 B) 15 C) 4 D) 0

Use implicit differentiation to find dy/dx.

26) $\cos xy + x^4 = y^4$ 26) _____

A) $\frac{4x^3 - y\sin xy}{4y^3 + x\sin xy}$ B) $\frac{4x^3 - x\sin xy}{4y^3}$ C) $\frac{4x^3 + y\sin xy}{4y^3 - x\sin xy}$ D) $\frac{4x^3 + x\sin xy}{4y^3}$

27) $xy + x + y = x^2y^2$ 27) _____

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

28) $y = f(x) = 2x + x^3$ has an inverse function that is difficult to calculate. We wish to know the derivative $\frac{d}{dx}f^{-1}(x)$ at the point (12,2). Use your knowledge of the derivative of $y = f(x)$ to calculate $\frac{d}{dx}f^{-1}(x)$ at the point (12,2). 28) _____

A) $\frac{1}{434}$ B) $\frac{1}{14}$ C) 14 D) 434

Find the derivative of y with respect to x, t, or θ, as appropriate.

29) $y = \ln 8x^2$ 29) _____

A) $\frac{2x}{x^2 + 8}$ B) $\frac{2}{x}$ C) $\frac{1}{2x + 8}$ D) $\frac{16}{x}$

Find the derivative of y with respect to x, t, or θ, as appropriate.

30) $y = e^{(4\sqrt{x} + x^5)}$ 30) _____

A) $\left(\frac{2}{\sqrt{x}} + 5x^4\right) e^{(4\sqrt{x} + x^5)}$ B) $4\sqrt{x + 5x^4})\ e^{(4\sqrt{x} + x^5)}$

C) $(4\sqrt{x + 5x^4}) \ln (4\sqrt{x + x^5})$ D) $e^{(2\sqrt{x} + 5x^4)}$

Find the derivative of y with respect to x, t, or θ, as appropriate.

31) $y = \frac{\ln x}{x^5}$ 31) _____

A) $\frac{1 - 5\ln x}{x^{10}}$ B) $\frac{1 + 5\ln x}{x^{10}}$ C) $\frac{5\ln x - 1}{x^6}$ D) $\frac{1 - 5\ln x}{x^6}$

Find the derivative of y with respect to x.

32) $y = \cos^{-1} (9x^2 - 4)$ 32) _____

A) $\frac{18x}{\sqrt{1 - (9x^2 - 4)^2}}$ B) $\frac{18x}{1 + (9x^2 - 4)^2}$

C) $\frac{-18x}{\sqrt{1 - (9x^2 - 4)^2}}$ D) $\frac{9}{\sqrt{1 + (9x^2 - 4)^2}}$

33) $y = \sin^{-1}\left(\frac{1}{x^2}\right)$ 33) _____

A) $\frac{-2}{x\sqrt{x^4 - 1}}$ B) $\frac{-2}{1 + x^4}$ C) $\frac{-2x^2}{\sqrt{1 - x^4}}$ D) $\frac{-2}{x\sqrt{1 - x^4}}$

Solve the problem.

34) 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? 34) _____

A) $\frac{dm}{dt} = -\frac{2m}{v}\frac{dv}{dt}$

B) $\frac{dm}{dt} = -2mv^3\frac{dv}{dt}$

C) $\frac{dm}{dt} = \frac{m}{v}\frac{dv}{dt}$

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

35) The range R of a projectile is related to the initial velocity v and projection angle θ by the equation $R = \frac{v^2 \sin 2\theta}{g}$, where g is a constant. How is dR/dt related to dθ/dt if v is constant? 35) _____

A) $\frac{dR}{dt} = -\frac{v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$

B) $\frac{dR}{dt} = \frac{2v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$

C) $\frac{dR}{dt} = \frac{v^2 \cos 2\theta}{g}\frac{d\theta}{dt}$

D) $\frac{dR}{dt} = \frac{2v^2 \sin 2\theta}{g}\frac{d\theta}{dt}$

36) A wheel with radius 3 m rolls at 18 rad/s. How fast is a point on the rim of the wheel rising when the point is π/3 radians above the horizontal (and rising)? (Round your answer to one decimal place.) 36) _____

A) 54.0 m/s B) 27.0 m/s C) 108.0 m/s D) 13.5 m/s

37) A piece of land is shaped like a right triangle. Two people start at the right angle of the triangle at the same time, and walk at the same speed along different legs of the triangle. If the area formed by the positions of the two people and their starting point (the right angle) is changing at 2 m^2/s, then how fast are the people moving when they are 3 m from the right angle? (Round your answer to two decimal places.) 37) _____

A) 1.33 m/s B) 4.50 m/s C) 0.33 m/s D) 0.67 m/s

Solve the problem. Round your answer, if appropriate.

38) As the zoom lens in a camera moves in and out, the size of the rectangular image changes. Assume that the current image is 7 cm × 6 cm. Find the rate at which the area of the image is changing (dA/dt) if the length of the image is changing at 0.7 cm/s and the width of the image is changing at 0.1 cm/s. 38) _____

A) 9.8 cm^2/sec B) 11.0 cm^2/sec C) 5.5 cm^2/sec D) 4.9 cm^2/sec

Find dy.

39) $y = 9\sqrt{x} + \frac{2}{x}$ 39) _____

A) $\left(\frac{9\sqrt{x}}{2} - \frac{2}{x^2}\right)dx$

B) $\left(\frac{9}{2\sqrt{x}} + \frac{2}{x^2}\right)dx$

C) $\left(\frac{9\sqrt{x}}{2} + \frac{2}{x^2}\right)dx$

D) $\left(\frac{9}{2\sqrt{x}} - \frac{2}{x^2}\right)dx$

Solve the problem.

40) $V = \frac{4}{3}\pi r^3$, where r is the radius, in centimeters. By approximately how much does the volume of a sphere increase when the radius is increased from 3.0 cm to 3.1 cm? (Use 3.14 for π.) 40) _____

A) 11.5 cm^3 B) 11.3 cm^3 C) 0.4 cm^3 D) 11.1 cm^3

Answer Key
Testname: MATH 1540 QUIZ 2 PRACTICE-UPDATED

1) D
2) C
3) B
4) A
5) D
6) B
7) B
8) C
9) C
10) A
11) C
12) D
13) A
14) B
15) A
16) D
17) B
18) A
19) D
20) C
21) B
22) D
23) A
24) B
25) D
26) A
27) C
28) B
29) B
30) A
31) D
32) C
33) A
34) A
35) B
36) B
37) D
38) D
39) D
40) B