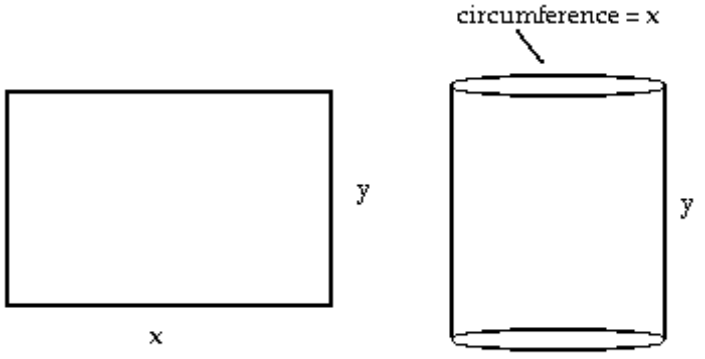
AB Fall Final Exam Review 2010-2011

Name_____ Date_____Period_____

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

Solve the problem.

1) A rectangular sheet of perimeter 33 cm and dimensions x cm by y cm is to be rolled into a cylinder as shown in part (a) of the figure. What values of x and y give the largest volume? 1) _____



A) $x = 13$ cm; $y = \frac{7}{2}$ cm

B) $x = 12$ cm; $y = \frac{9}{2}$ cm

C) $x = 11$ cm; $y = \frac{11}{2}$ cm

D) $x = 10$ cm; $y = \frac{13}{2}$ cm

Use the First Derivative Test to determine the local extrema of the function, and identify any absolute extrema.

2) $y = xe^{2x}$ 2) _____

A) Absolute maximum at $\left(-\frac{1}{2}, -\frac{e}{2}\right)$

B) Absolute minimum at $\left(-\frac{1}{2}, -\frac{1}{2e}\right)$

C) Absolute maximum at $\left(\frac{1}{2}, \frac{1}{2e}\right)$

D) Absolute minimum at $\left(\frac{1}{2}, \frac{e}{2}\right)$

Use the Concavity Test to find the intervals where the graph of the function is concave up.

3) $y = x^3 - 3x^2 - 9x + 3$ 3) _____

A) $(1, \infty)$ B) $(-\infty, 1), (1, \infty)$ C) $(-\infty, 1)$ D) None

Find the points of inflection.

4) $y = x\sqrt{7 - x^2}$ 4) _____

A) (0, 0)

B) (0, 7)

C) No inflection points.

D) (7, 0)

Use the Second Derivative Test to find the local extrema for the function.

5) $y = 80x^3 - 3x^5$ 5) _____

A) Local maximum at (0, 0), local minimum: (4, 2048)

B) Local minimum: (-4, -2048), local maximum at (0, 0)

C) Local minimum: (-4, -2048),local minimum at (0, 0), relative maximum: (4, 2048)

D) Local minimum: (-4, -2048),local maximum: (4, 2048)

Give an appropriate answer.

6) Find the value or values of c that satisfy $\frac{f(b) - f(a)}{b - a} = f'(c)$ for the function $f(x) = x + \frac{48}{x}$ on the interval [3, 16]. 6) _____

A) $0, 4\sqrt{3}$ B) 3, 16 C) $4\sqrt{3}$ D) $-4\sqrt{3}, 4\sqrt{3}$

Use analytic methods to find the local extrema.

7) $h(x) = \frac{x - 1}{x^2 + 5x + 10}$ 7) _____

A) Local minimum at x = -4; local maximum at x = 5
B) Local minimum at x = -3; local maximum at x = 5
C) Local minimum at x = -3; no local maxima
D) No local extrema

Find dy/dx.

8) $y = 7xe^x - 7e^x$ 8) _____

A) $7xe^x + 14e^x$ B) $7xe^x$ C) $7e^x$ D) 7x

9) $y = \ln(\ln 5x)$ 9) _____

A) $\frac{1}{5x}$ B) $\frac{1}{x}$ C) $\frac{1}{\ln 5x}$ D) $\frac{1}{x \ln 5x}$

Use logarithmic differentiation to find dy/dx.

10) $y = 22^{-x}$ 10) _____

A) -22^{-x} B) $-\ln 22\,(22^{-x})$ C) 22^{-x} D) $\ln 22\,(22^{-x})$

Find the derivative of the given function.

11) $y = \tan^{-1}\sqrt{5x}$ 11) _____

A) $\frac{5}{2(1 + 5x)\sqrt{5x}}$ B) $\frac{1}{1 + 5x}$ C) $\frac{1}{10\sqrt{5x(1 + 5x)}}$ D) $\frac{1}{\sqrt{1 - 5x}}$

12) $y = \frac{1}{\sin^{-1} 4x}$ 12) _____

A) $\frac{-4}{\sqrt{1 - 16x^2}}$ B) $\frac{-4}{\sqrt{1 - 16x^2}\,(\sin^{-1} 4x)^2}$

C) $\frac{\sqrt{1 - 16x^2}}{4}$ D) $\frac{-1}{(\sin^{-1} 4x)^2}$

Find dy/dx by implicit differentiation. If applicable, express the result in terms of x and y.

13) $\cos xy + x^5 = y^5$ 13) _____

A) $\frac{5x^4 - y \sin xy}{5y^4 + x \sin xy}$ B) $\frac{5x^4 + x \sin xy}{5y^4}$ C) $\frac{5x^4 - x \sin xy}{5y^4}$ D) $\frac{5x^4 + y \sin xy}{5y^4 - x \sin xy}$

Solve the problem.

14) The position of a particle moving along a coordinate line is $s = \sqrt{3 + 6t}$, with s in meters and t in seconds. Find the particle's velocity at t = 1 sec. 14) _____

A) $\frac{1}{6}$ m/sec B) $-\frac{1}{3}$ m/sec C) 2 m/sec D) 1 m/sec

Find dy/dx.

15) $y = 6 \sec^3 x$ 15) _____

A) $18 \tan x \sec^3 x$ B) $18 \tan^2 x \sec^2 x$ C) $18 \sec^2 x$ D) $18 \tan^2 x \sec^3 x$

Find y ″.

16) $y = \sqrt{3x + 5}$ 16) _____

A) $-\frac{9}{4(3x + 5)^{3/2}}$ B) $-\frac{1}{4(3x + 5)^{3/2}}$ C) $-\frac{9\sqrt{3x + 5}}{4}$ D) $\frac{3}{2\sqrt{3x + 5}}$

Suppose that the functions f and g and their derivatives with respect to x have the following values at the given values of x. Find the derivative with respect to x of the given combination at the given value of x.

17)

x	f(x)	g(x)	f ′(x)	g ′(x)
3	1	16	8	3
4	-3	3	5	-4

17) _____

$\sqrt{f(x) + g(x)}$ at x = 3

A) $-\frac{1}{2\sqrt{17}}$ B) $\frac{11}{\sqrt{17}}$ C) $\frac{1}{2\sqrt{17}}$ D) $\frac{11}{2\sqrt{17}}$

Find the indicated derivative.

18) Find y ″ if y = 5x sin x. 18) _____

A) y ″ = - 5x sin x B) y ″ = 10 cos x - 5x sin x

C) y ″ = - 10 cos x + 5x sin x D) y ″ = 5 cos x - 10x sin x

Solve the problem.

19) 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. 19) _____

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

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

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

20) $f(u) = \frac{1}{u}$, $u = g(x) = 7x - x^2$, x = 1 20) _____

A) $-\frac{1}{5}$ B) $\frac{5}{36}$ C) $-\frac{5}{36}$ D) $\frac{1}{5}$

Find the horizontal tangents of the curve.

21) $y = x^4 - 2x^2 + 1$ 21) _____

A) At x = 1, -1, B) At x = 0, 1 C) At x = 0, 1, -1 D) At x = 0

Find dy/dx.

22) $y = (1 - 5x^2)(9x^2 - 180)$ 22) _____

A) $-180x^3 + 1818$ B) $-180x^3 + 1818x$

C) $45x^3 + 909x$ D) $-180x^4 + 1818x^2$

23) $y = \frac{7x - 8}{8x^2 + 3}$ 23) _____

A) $\frac{-56x^2 + 107x + 45}{(8x^2 + 3)^2}$ B) $\frac{-56x^2 + 128x + 21}{(8x^2 + 3)^2}$

C) $\frac{56x^3 - 112x^2 + 149x}{(8x^2 + 3)^2}$ D) $\frac{168x^2 - 128x + 21}{(8x^2 + 3)^2}$

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.

24) $u(2) = 6$, $u'(2) = 4$, $v(2) = -3$, $v'(2) = -5$. 24) _____

$\frac{d}{dx}(uv)$ at $x = 2$

A) 39 B) -18 C) -42 D) 42

Find dy/dx.

25) $y = \frac{\sqrt{x} - 8}{\sqrt{x} + 8}$ 25) _____

A) $\frac{16}{(x + 8)\sqrt{x - 64}}$ B) $-\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$ C) $\frac{8}{x + 8}$ D) $\frac{8}{\sqrt{x}(\sqrt{x} + 8)^2}$

Determine the values of x for which the function is differentiable.

26) $y = \sqrt{x - 5}$ 26) _____

A) All reals greater than -5 B) All reals except 5

C) All reals greater than or equal to 5 D) All reals greater than 5

Solve the problem.

27) Assume that a watermelon dropped from a tall building falls $y = 16t^2$ ft in t sec. Find the watermelon's speed at the instant t = 6 sec. 27) _____

A) 96 ft/sec B) 192 ft/sec C) 194 ft/sec D) 97 ft/sec

Determine the limit by substitution.

28) $\lim_{x \to 8} \frac{x^2 + 64}{x + 8}$ 28) _____

A) 16 B) 0 C) Does not exist D) 8

Determine the limit algebraically, if it exists.

29) $\lim_{x \to 7} \frac{x^2 + 2x - 63}{x - 7}$ 29) _____

A) Does not exist B) 16 C) 2 D) 0

30) $\lim_{x \to 0} \dfrac{\dfrac{1}{x+3} - \dfrac{1}{3}}{x}$ 30) _____

A) Does not exist B) 0 C) $-\frac{1}{9}$ D) $\frac{1}{9}$

Find the indicated limit.

31) $\lim_{x \to 0^+} \dfrac{7x}{|x|}$ 31) _____

A) 7 B) Does not exist C) 0 D) -7

Find the limit.

32) Let $\lim_{x \to 10} f(x) = 1$ and $\lim_{x \to 10} g(x) = 5$. Find $\lim_{x \to 10} [f(x) + g(x)]^2$. 32) _____

A) 26 B) 36 C) 6 D) -4

Find the limit, if it exists.

33) $\lim_{x \to -\infty} \dfrac{4x^3 + 3x^2}{x - 6x^2}$ 33) _____

A) ∞ B) $-\frac{1}{2}$ C) $-\infty$ D) 4