Advanced Placement Calculus BC
Summer Packet

- Due back on the first day of school
- If you have any questions you can email me at guerrerali@watertownps.org
- You may use notes from previous courses, books, and any websites as resources
- You must attach any scrap paper with your work even for the multiple choice section
- This will count for 3 homework grades in the formative category
- All topics from AP Calculus AB should be reviewed over the summer
- An assessment will be given on the first day
- We will spend the first quarter reviewing ALL AB material before starting any BC topics.

Name:_____ **Date:**_____

A.P. Calculus BC **Calc AB Review**

Part I: Circle your answer to the multiple choice questions below. You may NOT use a calculator on this part.

1.) At which of the five points on the graph in the figure below are $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ both negative?

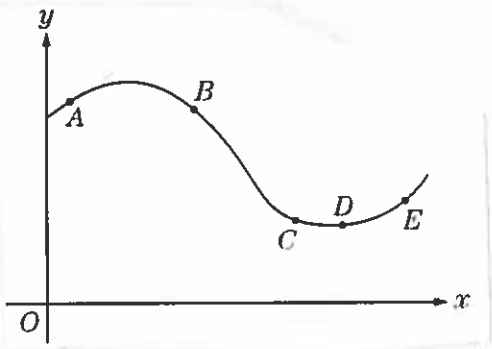
A) A

B) B

C) C

D) D

E) E



2.) The slope of the tangent to the curve $y^3x + y^2x^2 = 6$ at (2, 1) is

A) $\frac{-3}{2}$

B) - 1

C) $\frac{-5}{14}$

D) $\frac{-3}{14}$

E) 0

3.) Which of the following statements about the function given by $f(x) = x^4 - 2x^3$ is true?

A) The function has no relative extremum.

B) The graph of the function has one point of inflection and the function has two relative extrema.

C) The graph of the function has two points of inflection and the function has one relative extremum.

D) The graph of the function has two points of inflection and the function has two relative extrema.

E) The graph of the function has two points of inflection and the function has three relative extrema.

4.) If $f(x) = \sin^2(3-x)$, then f'(0) =

A) – 2 cos 3

B) -2 sin 3 cos 3

C) 6 cos 3

D) 2 sin 3 cos 3

E) 6 sin 3 cos 3

5.) What is the average rate of change of the function f given by $f(x) = x^4 - 5x$ on the closed interval [0 , 3]?

A) 8.5
B) 8.7
C) 22
D) 33
E) 66

6.) The position of a particle moving along a line is given by $s(t) = 2t^3 - 24t^2 + 90t + 7$ for t ≥ 0. For what values of t is the speed of the particle increasing?

A) 3 < t < 4 only
B) t > 4 only
C) t > 5 only
D) 0 < t < 3 and t > 5
E) 3 < t < 4 and t > 5

7.) $\int (x-1)\sqrt{x}\,dx$ =

A) $\frac{3}{2}\sqrt{x} - \frac{1}{\sqrt{x}} + C$

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

C) $\frac{1}{2}x^2 - x + C$

D) $\frac{2}{5}x^{\frac{5}{2}} - \frac{2}{3}x^{\frac{3}{2}} + C$

E) $\frac{1}{2}x^2 + 2x^{\frac{3}{2}} - x + C$

8.) What is $\lim_{x\to\infty} \frac{x^2-4}{2+x-4x^2}$?

A) - 2

B) $\frac{-1}{4}$

C) $\frac{1}{2}$

D) 1

E) NDE

9.) Let S be the region enclosed by the graphs of y = 2x and $y = 2x^3$ for $0 \le x \le 1$. What is the volume of the solid generated when S is revolved about the line y = 3?

A) $\pi\int_0^1((3-2x^2)^2-(3-2x)^2)dx$

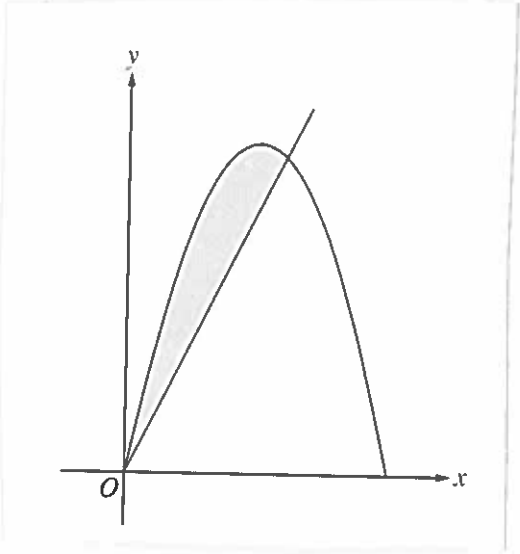
B) $\pi\int_0^1((3-2x)^2-(3-2x^2)^2)dx$

C) $\pi\int_0^1(4x^2-4x^4)dx$

D) $\pi\int_0^1((3-\frac{y}{2})^2-(3-\sqrt{\frac{y}{2}})^2)dy$

E) $\pi\int_0^1((3-\sqrt{\frac{y}{2}})^2-(3-\frac{y}{2})^2)dy$

10.) The figure below shows the graph of $y = 5x - x^2$ and the graph of the line y = 2x. What is the area of the shaded region?



A) $\frac{25}{6}$

B) $\frac{9}{2}$

C) 9

D) $\frac{27}{2}$

E) $\frac{45}{2}$

11.) If $f(x)=\frac{3x^2+x}{3x^2-x}$ then f'(x) is

A) 1 B) $\frac{6x^2+1}{6x^2-1}$ C) $\frac{-6}{(3x-1)^2}$ D) $\frac{-2x^2}{(x^2-x)^2}$ E) $\frac{36x^3-2x}{(x^2-x)^2}$

12.) If $x^2 - 2xy + 3y^2 = 8, then \frac{dy}{dx} =$

A) $\frac{8+2y-2x}{6y-2x}$ B) $\frac{3y-x}{y-x}$ C) $\frac{2x-2y}{6y-2x}$

D) $\frac{1}{3}$ E) $\frac{y-x}{3y-x}$

13.) If $f(x) = \sec x + \csc x, then\ f'(x) =$

A) 0
B) $\sec^2 x + \csc^2 x$
C) $\csc x - \sec x$
D) $\sec x \tan x + \csc x \cot x$
E) $\sec x \tan x - \csc x \cot x$

14.) $\int x\sqrt{5x^2 - 4}dx =$

A) $\frac{1}{10}(5x^2 - 4)^{\frac{3}{2}} + C$ D) $\frac{20}{3}(5x^2 - 4)^{\frac{3}{2}} + C$

B) $\frac{1}{15}(5x^2 - 4)^{\frac{3}{2}} + C$ E) $\frac{3}{20}(5x^2 - 4)^{\frac{3}{2}} + C$

C) $\frac{-1}{5}(5x^2 - 4)^{\frac{1}{2}} + C$

15.) If $f(x) = \begin{cases} x^2 + 5 \ if \ x < 2 \\ 7x - 5 \ if \ x \geq 2 \end{cases}$ for all real numbers x, which of the following must be true?

I. f(x) is continuous everywhere
II. f(x) is differentiable everywhere
III. f(x) has a local minimum at x = 2

A) I only B) I & II only C) II & III only D) I & III only E) I, II, & III

16.) $\int \left(e^{3\ln x} + e^{3x}\right)dx =$

A) $3 + \frac{e^{3x}}{3} + C$

B) $\frac{x^4}{4} + 3e^{3x} + C$

C) $\frac{e^{x^4}}{4} + 3e^{3x} + C$

D) $\frac{e^{x^4}}{4} + \frac{e^{3x}}{3} + C$

(E) $\frac{x^4}{4} + \frac{e^{3x}}{3} + C$

17.) $\int x\sqrt{x+3}dx =$

A) $\frac{2}{3}(x)^{\frac{3}{2}} + 6(x)^{\frac{1}{2}} + C$

B) $\frac{2(x+3)^{\frac{3}{2}}}{3} + C$

C) $\frac{2}{5}(x+3)^{\frac{5}{2}} - 2(x+3)^{\frac{3}{2}} + C$

D) $\frac{3(x+3)^{\frac{3}{2}}}{2} + C$

E) $\frac{4x^2(x+3)^{\frac{3}{2}}}{3} + C$

18.) If $f(x) = \ln(\ln(1-x))$, then f'(x) =

A) $\frac{-1}{\ln(1-x)}$

B) $\frac{1}{(1-x)\ln(1-x)}$

C) $\frac{1}{(1-x)^2}$

D) $\frac{-1}{(1-x)\ln(1-x)}$

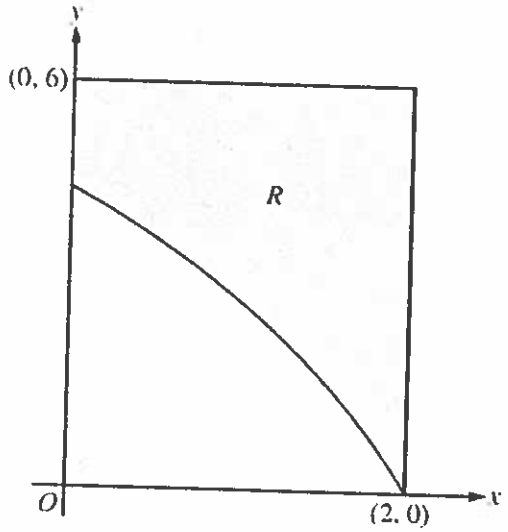
E) $\frac{-1}{\ln(1-x)^2}$

Name: _____ Part III Open ends

1.)

CALCULUS AB
SECTION II, Part A
Time—45 minutes
Number of problems—3

A graphing calculator is required for some problems or parts of problems.



1. In the figure above, R is the shaded region in the first quadrant bounded by the graph of $y = 4\ln(3 - x)$, the horizontal line $y = 6$, and the vertical line $x = 2$.

   (a) Find the area of R.

   (b) Find the volume of the solid generated when R is revolved about the horizontal line $y = 8$.

   (c) The region R is the base of a solid. For this solid, each cross section perpendicular to the x-axis is a square. Find the volume of the solid.

2.)

Consider the curve given by $x^2 + 4y^2 = 7 + 3xy$.

(a) Show that $\frac{dy}{dx} = \frac{3y - 2x}{8y - 3x}$.

(b) Show that there is a point P with x-coordinate 3 at which the line tangent to the curve at P is horizontal. Find the y-coordinate of P.

(c) Find the value of $\frac{d^2y}{dx^2}$ at the point P found in part (b). Does the curve have a local maximum, a local minimum, or neither at the point P ? Justify your answer.

A)

3)

:)

CHLC BC

Kuta Software - Infinite Calculus Name_____

Curve Sketching

Date_____ Period____

For each problem, find the: x and y intercepts, x-coordinates of the critical points, open intervals where the function is increasing and decreasing, x-coordinates of the inflection points, open intervals where the function is concave up and concave down, and relative minima and maxima. Using this information, sketch the graph of the function.

1) $y = -\frac{x^3}{3} + x^2$