AP/IB Calculus
Smith

Name Keanu Vestil

Exam-Chapter Three-Part I
Section I-Part A
Number of Questions - 14

A graphing calculator MAY NOT BE USED on this part of the examination.

1. $\frac{d}{dx}\left(\frac{1}{x^3} - \frac{1}{x} + x^2\right)$ at $x = -1$ is $\frac{-3}{x^4} + \frac{1}{x^2} + 2x$

$-3 + 1 - 2$

(A) -6 (B) -4 (C) 0 (D) 2 (E) 6

2. $y = (4x+1)^2(1-x)^3$, $y' =$ $8(4x+1)(1-x)^3 + (4x+1)^2(-)3(1-x)^2$

$8(x+1)(1-x)^3 + (4x+1)^2 3(1-x)^2$ $x=0, y=5$; $x=1, y=0$; $x=2, y=-24-3(81)$

[a] $(4x+1)(1-x)^2(5-4x)$ [b] ~~$(4x+1)(1-x)^2(4x+11)$~~

$x=0$ $y=5-(9)(-3)$

[c] $5(4x+1)(1-x)^2(1-4x)$ [d] ~~$(4x+1)(1-x)^2(11-20x)$~~ What

$x=0$, $y=5-5(9)\ldots$

[e] ~~$-24(4x+1)(1-x)^2$~~

$x=0$ $y=$

$\frac{x(x+1) - x(x-1)}{(x+1)^2}$ $\frac{2-0}{4}$

3. If $f(x) = \frac{x-1}{x+1}$ *for all* $x \neq -1$, then $f'(1) =$

(A) -1 (B) $-1/2$ (C) 0 (D) $1/2$ (E) 1

4. Find all horizontal asymptotes for $f(x) = \frac{4x}{\sqrt{x^2+9}}$.

(a) $y = \pm 1$ (b) $y = 4$ (c) $y = \pm 4$

(d) $y = 0$ (e) None of these

5. If $f(x)=\frac{1}{x^2+1}$, $g(x)=\sqrt{x}$, then the derivative of f(g(x)) is

[a] $\frac{-\sqrt{x}}{(x^2+1)^2}$ [b] $-(x+1)^{-2}$ [c] $\frac{-2x}{(x^2+1)^2}$

[d] $\frac{1}{(x+1)^2}$ [e] $\frac{1}{2\sqrt{x}(x+1)}$

$\left((\sqrt{x})^2+1\right)^{-1}$

6. The $\lim_{x\to 0}\frac{\cos(\frac{\pi}{2}+x)+\cos(\frac{\pi}{2}+x)}{x}$ is

cos 0

$-1\left((\sqrt{x})^2+1\right)^{-2}\cdot 2\sqrt{x}\cdot\frac{1}{2\sqrt{x}}$

[a] 1 [b] -2 [c] -1 [d] 0 [e] 2

$(x+1)^{-}$

2

7. $\lim_{h\to 0}\frac{\sqrt[3]{8+h}-2}{h}$ is

$x^{\frac{1}{3}}$ $\frac{1}{3\sqrt[3]{x^2}}$

[a] 0 [b] 1/12 [c] 1 [d] 192 [e] ∞

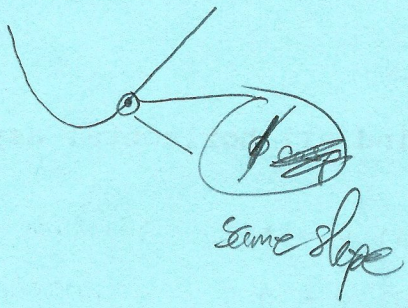
8. Suppose $\lim_{x\to 0}\frac{g(x)-g(0)}{x}=1$. It follows that

[a] g is not defined at x = 0
[b] g is not continuous at x = 0
[c] The limit of g(x) as x approaches 0 equals 1
[d] g'(0) = 1
[e] g'(1) = 0

2(3)

9. At x=3, the function given by $f(x)=\begin{cases}x^2, & x<3\\ 6x-9, & x\geq 3\end{cases}$ is

(A) undefined
(B) continuous but not differentiable
(C) differentiable but not continuous
(D) neither continuous nor differentiable
(E) both continuous and differentiable



10. If $\lim_{x \to 3} f(x) = 7$, which of the following must be true?

I. f is continuous at x = 3
II. f is differentiable at x = 3.
III. f(3) = 7

(A) none (B) II only (C) III only
(D) I and III only (E) I, II, and III

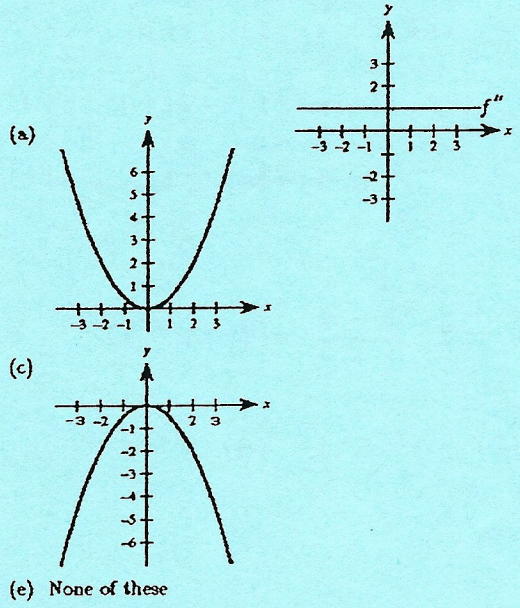
11. If $f(x) = 2 - \left|4 + \frac{x}{2}\right|$, then f(x) is not differentiable at x =

[a] -2 [b] 2 [c] 0 [d] -8 [e] 8

12. The slope of the curve $y^3 - xy^2 = 4$ at the point where y = 2 is

[a] -2 [b] 1/4 [c] -1/2 [d] 1/2 [e] 2

13. The figure given in the graph is the second derivative of a polynomial function, f. Choose a graph of f.



14. Let f(x) be a polynomial function such that f(4) = -1, f'(4) = 2, f''(4) = 0. If x < 4 then f''(x) < 0 and if x > 4 then f''(x) > 0. The point (4, -1) is a _____ of the graph of f.

(a) Relative maximum (b) Relative minimum (c) Critical number

(d) Point of inflection (e) None of these

AP/IB Calculus
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Name Karen Vogel

Exam-Chapter Three-Part I
Section I-Part B
Number of Questions - 8

A graphing calculator <u>IS REQUIRED</u> for some questions on this part of the examination.

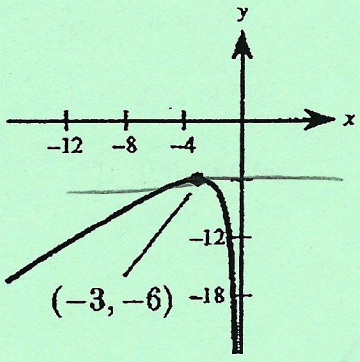
1. Find the value of the derivative (if it exists) at the indicated extremum.

(a) 2

(b) -6

(c) 0

(d) The derivative does not exist



2. Given $f(x)=9-\frac{14}{x}$, find all c in the interval $(2,7)$ such that $f'(c)=\frac{f(7)-f(2)}{7-2}$.

[a] 4.5 [b] ± 3.742 [c] 3.742 [d] 1.556

[e] none of these

$\frac{14}{x^2}=1$ $\pm\sqrt{14}$

3. Given that $f(x)=-x^2+12x-34$, choose the correct statement.

[a] f' is positive on the interval $(6,\infty)$ $-2x+12$

[b] f' is positive on the interval $(-\infty,\infty)$

[c] f' is negative on the interval $(6,\infty)$

[d] f' is negative on the interval $(-\infty,6)$

[e] none of these

4. Give the sign of the second derivative of f at the indicated point.

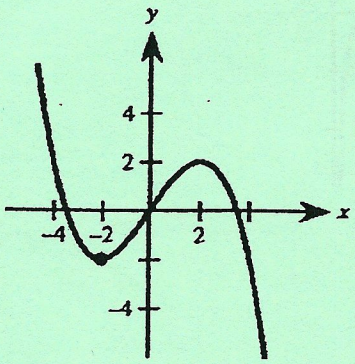
[a] zero

[b] negative

[c] positive

[d] the sign cannot be determined

[e] none of these



5. Which statement is **not** true of the graph of $f(x)=(x+3)(x-4)^2$? Choose as many as apply

[a] ~~f has a relative minimum at (4,0)~~

[b] f has a point of inflection at (4,0)

[c] f has a relative maximum at (−.667,50.815)

[d] f has a point of inflection at (-.667, 50.815)

[e] none of these

6. The radius of a circle is increasing at a constant rate of 0.2 meters per second. What is the rate of increase in the area of the circle at the instant when the circumference of the circle is 20π meters?

$R' = 0.2 \quad R =$ $\frac{20\pi}{2\pi} = 10$ $r = 10$

[a] $0.04\pi\ m^2/\text{sec}$

[b] $0.4\pi\ m^2/\text{sec}$

[c] $4\pi\ m^2/\text{sec}$

[d] $20\pi\ m^2/\text{sec}$

[e] $100\pi\ m^2/\text{sec}$

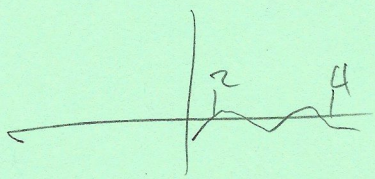
$\pi R^2 \quad A' = 2\pi R \cdot R'$

$A' = 2\pi \cdot 10 \cdot 0.2$

$= 4\pi$

7. Let f be the function with derivative given by $f'(x)=\sin(x^2+1)$. How many extrema does f have on the interval $2 < x < 4$?

[a] one [b] two [c] three [d] four [e] five



8. The function f has first derivative given by $f'(x)=\frac{\sqrt{x}}{1+x+x^3}$. What is the x-coordinate of the inflection point of the graph of f?

[a] 1.008

[b] 0.473

[c] 0

[d] -0.278

[e] The graph of f has no inflection points

Student Grade Report

Legend: Incorrect: ☐

Student: Vestil, Keanu

	Grade	Total Score	Score (%)
Overall	B	18.00 / 22.00	81.82

Responses

Question	Response	Correct Answer
1	B	
2	C	
3	D	
4	C	
5	B	
6	E	B
7	A	B
8	D	

Question	Response	Correct Answer
9	E	
10	A	
11	D	
12	D	
13	A	
14	D	
15	C	
16	B	C

Question	Response	Correct Answer
17	C	
18	C	
19	(B,D)	(A&C)
20	C	
21	D	
22	B