Keane
Vestil

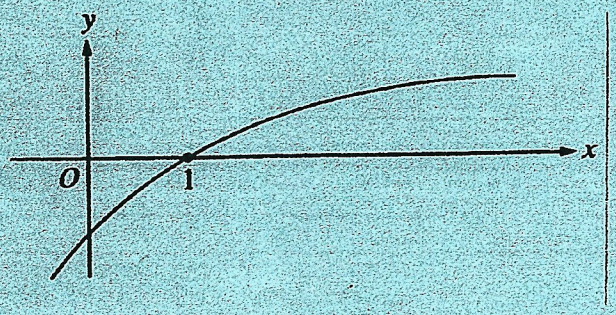
AP/IB Calculus BC
Smith

Exam-Chapter Five
Section I-Part A
Number of Questions-15

A graphing calculator is NOT ALLOWED on this section of the exam.

1. $\int_1^e \left(\frac{x^2-1}{x}\right)dx =$ $\frac{x^2}{2} - \ln|x| \rightarrow \left(\frac{e^2}{2}-1\right)-\left(\frac{1}{2}-0\right)$ $\frac{e^2}{2}-1-\frac{1}{2}$

[a] $e-\frac{1}{e}$ [b] e^2-e [c] $\frac{e^2}{2}-e+\frac{1}{2}$ [d] e^2-2 [e] $\frac{e^2}{2}-\frac{3}{2}$



2. The graph of a twice differentiable function f is graphed above. Which of the following is true?

[a] $f(1)<f'(1)<f''(1)$

[b] $f(1)<f''(1)<f'(1)$

[c] $f'(1)<f(1)<f''(1)$

[d] $f''(1)<f(1)<f'(1)$

[e] $f''(1)<f'(1)<f(1)$

3. Let f be a function defined and continuous on the closed interval [a,b]. If f has a relative maximum at c and $a < c < b$, which of the following statements must be true?

I. $f'(c)$ exists

II. If $f'(c)$ exists, then $f'(c)=0$

III. If $f''(c)$ exists, then $f''(c)\leq 0$

[a] II only [b] III only [c] I and II only [d] I and III only [e] II and III only

4. Find $\lim_{b\to\infty} \int_0^b x^2 e^{-x^3} dx$

$u=-x^3$ $\quad \frac{-2e^u}{-3x^2}$ $\quad -\frac{1}{3}\int_0^{\infty} e^u du$

[a] $-\frac{1}{3}$ [b] 0 [c] $\frac{1}{3}$ [d] 1 [e] nonexistent

$-\frac{e^{-x^3}}{3}$ wait... $-\frac{e^{-\infty^3}}{3} + \frac{e^{0^3}}{3}$ nice

$=0 + \frac{1}{3}$

5. $\lim_{x\to 1} \frac{\int_1^x e^{t^2} dt}{x^2-1} =$ $\quad \frac{0}{x^2-1}$ $\quad \frac{0}{0}$

[a] 0 [b] 1 [c] $\frac{e}{2}$ [d] e [e] nonexistent

6. $\int(\sec^2 x)(\tan^2 x)dx =$

[a] $\frac{1}{3}\tan^3 x + c$ $\frac{1}{\cos^3 x}$ $\frac{1}{}$

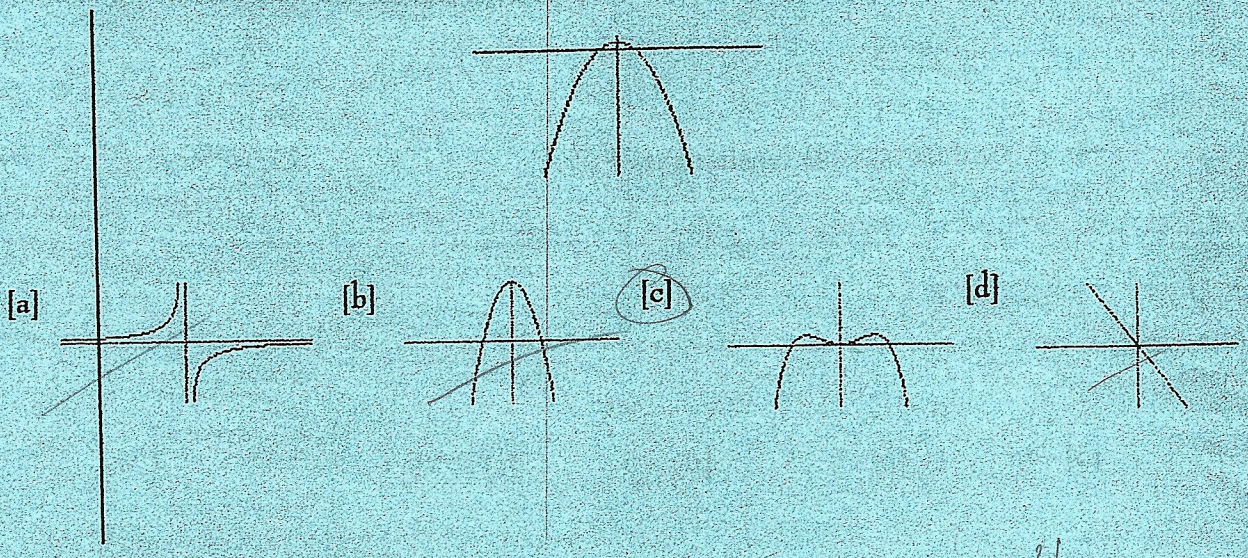
[b] $\tan^3 x + c$

[c] $\frac{1}{2}\tan^2 x + c$

[d] $\frac{1}{3}\sec^3 x + c$

[e] $\tan^2 x + c$

7. The graph below is the **second derivative,** f'' . Choose the function f.



8. The shortest distance from the curve $xy=4$ to the origin is $y = \frac{4}{x}$ $4(\frac{1}{x})$

[a] 2 [b] 4 [c] $\sqrt{2}$ [d] $2\sqrt{2}$ [e] $\frac{1}{2}\sqrt{2}$

$\frac{-4}{x^2} = -1$ $y' = -1$

9. Suppose that f is a continuous function defined for all real numbers x and $f(-5)=3$ and $f(-1)=-2$. If $f(x)=0$ for one and only one value of x, then which of the following could be x?

[a] -7 [b] -2 [c] 0 [d] 1 [e] 2

10. Given the following data about a function f

x	3	3.5	4	4.5	5	5.5	6
$f(x)$	10	8	7	4	2	0	-1

Estimate $f'(4.25)$ $\frac{-3}{.5}$

[a] -5.5 [b] -3 [c] -6 [d] -2/3 [e] -3/2

11. Let f and g be differentiable functions such that

$f(1)=4$, $g(1)=3$, $f'(3)=-5$, $f'(1)=-4$, $g'(1)=-3$, $g'(3)=2$.

If $h(x)=f(g(x))$, then $h'(1)=$ $f'(g(1))\cdot g'(1) = -5 \cdot -3 = 15$

[a] -9 [b] 15 [c] 0 [d] -5 [e] -12

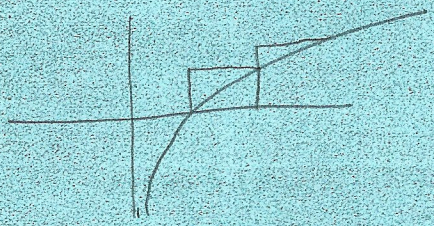
12. Let f and g be **inverse functions** such that

$f(1)=4,\ g(1)=3,\ f'(3)=-5,\ f'(1)=-4,\ g'(1)=-3,\ g'(3)=2$

Find $g'(4)$

[a] -1/4 [b] 1/4 [c] 4 [d] cannot be determined

13. If $\int_1^7 \ln x\,dx$ is approximated by 3 circumscribed rectangles of equal width on the x-axis, then the approximation is



[a] $\frac{1}{2}(\ln 3+\ln 5+\ln 7)$

[b] $\frac{1}{2}(\ln 1+\ln 3+\ln 5)$

[c] $2(\ln 3+\ln 5+\ln 7)$

[d] $2(\ln 3+\ln 5)$

[e] $\ln 1+2\ln 3+2\ln 5+\ln 7$

$2^{3x}\cdot 3x\ln 2$ $y=2^{3x}$

$\frac{1}{y}\frac{dy}{dx}=3x\ln 2$

14. $\int 2^{3x}dx=$

[a] $\frac{2^{3x}}{\ln 2}+c$ [b] $\frac{2^{3x}}{3\ln 2}+c$ [c] $\frac{2^{3x+1}}{3x+1}+c$

[d] $\frac{2^{3x}}{3}+c$ [e] $(\ln 2)2^{3x}+c$

15. The derivative of e^{e^x} is

[a] e^x [b] e^{e^x} [c] $e^{e^{x^2}}$ [d] $e^{(x+e^x)}$ [e] $e^{(xe^x)}$

$e^{e^x} \cdot e^x$ $e^{(x+e^x)}$

END OF SECTION I-PART A

Keane Vestil

AP/IB Calculus BC
Smith

Exam-Chapter Five
Section I-Part A
Number of Questions-10

A graphing calculator IS NEEDED to do some problems on this section of the exam.

1. If $y^2-2xy=21$, then $\frac{dy}{dx}$ at the point (2, -3) is

[a] -6/5 [b] -3/5 [c] -2/5 [d] 3/8 [e] 3/5

2. If the graph of $f(x)=Ax^2+Bx+C$ where A, B, and C are constants, passes through the point (-1,-15) and attains a relative maximum at the point (2,3), then the values of A, B, and C must be

~~[a] A = 2, B = 8, C = -5~~

[b] A = -2, B = 8, C = 5

[c] A = -2, B = 8, C = -5

~~[d] A = -2, B = -5, C = 8~~

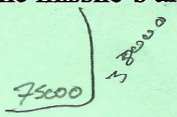
~~[e] A = -2, B = -5, C = 8~~

$2Ax+B=0$

$4A+B=0$

$-2+-8$

3. A missile rises vertically from a point on the ground 75,000 feet from a radar station. If the missile is rising at the rate of 16,500 feet per minute at the instant when it is 38,000 feet high, what is the approximate rate of change, in radians per minute, of the missile's angle of elevation from the radar station at this instant?



[a] 0.175 [b] 0.219 [c] 0.227 [d] 0.469 [e] 0.507

$A = \tan^{-1}\left(\frac{h}{75000}\right)$

4. $\lim_{h \to 0} \frac{(2+h)^3 - 2^3}{h} =$ $3(2^2)$ x^3 $3x^2$ ω

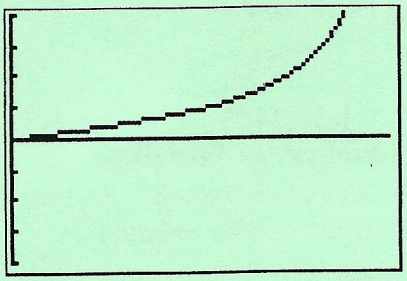
[a] 36 [b] 12 [c] 8 [d] 2 [e] 0

5. Suppose that f is a twice-differentiable function and $f(-x) = -f(x)$ for all real numbers x.

If $f(2) = 2$, then $\int_{-2}^{2} f'(x)dx =$

[a] -4 [b] -2 [c] 0 [d] 2 [e] 4

2+2



6. Given the graph above of $f(x)=\tan x$, where $0 \le x < \frac{\pi}{2}$, if the tangent line at $x=\frac{\pi}{4}$ is used to approximate $\tan\left(\frac{\pi}{5}\right)$, which of the following will be true?

[a] the approximation will be greater than $\tan\left(\frac{\pi}{5}\right)$

[b] the approximation will be less than $\tan\left(\frac{\pi}{5}\right)$

[c] the approximation will be equal to $\tan\left(\frac{\pi}{5}\right)$

[d] there is not enough information to determine the accuracy of the approximation

7. If a tangent line is used to estimate the value of $f'(2.01)$ for the function $f(x)=\log x$, then the approximation is...

[a] .303196 [b] .301030 [c] .303201 [d] .306030

$y - 0.301 =$

8. A right sum approximation for $\int_0^2 \sqrt[3]{x}\,dx$ is n rectangles is...

[a] $\left[\sqrt[3]{\frac{2}{n}}+\sqrt[3]{\frac{4}{n}}+\sqrt[3]{\frac{6}{n}}+\ldots\sqrt[3]{\frac{2n}{n}}\right]\frac{2}{n}$

[b] $\left[\sqrt[3]{\frac{0}{n}}+\sqrt[3]{\frac{2}{n}}+\sqrt[3]{\frac{4}{n}}+\ldots\sqrt[3]{\frac{2(n-1)}{n}}\right]\frac{2}{n}$

[c] $\left[\sqrt[3]{\frac{1}{2n}}+\sqrt[3]{\frac{3}{2n}}+\sqrt[3]{\frac{5}{2n}}+\ldots\sqrt[3]{\frac{2n}{2n}}\right]\frac{1}{n}$

[d] none of these

9. The average value of $f(x) = \cos t$ from $t = .7$ to $t = 1.1$ is

[a] .9999 [b] .7781 [c] .2470 [d] .6175

10. If $x^2 \frac{dy}{dx} + y = 0$ and if $y = 3$ when $x = 2$, what is the approximate value of y when $x = 4$?

[a] 2.635 [b] 2.336 [c] 2.031 [d] 1.883

$6x + 3 = 0$

$\frac{-3}{4}$

16 · .75

Student Grade Report

Legend: Incorrect: ☐

Student: Vestil, Keanu

	Grade	Total Score	Score (%)
Overall	B	20.00 / 25.00	80.00

Responses

Question	Response	Correct Answer
1	E	
2	D	
3	E	
4	C	
5	**E**	C
6	A	
7	C	
8	**A**	D
9	B	
10	C	
11	B	
12	A	
13	C	
14	B	
15	D	
16	**B**	E
17	C	
18	**D**	A
19	B	
20	E	
21	B	
22	C	
23	A	
24	D	
25	**C**	B