The Bellenot's Calcalus I MAC 2311 -

Prerequiste: "C-" or better in MAC 1142 or AMP grap 1 (placement test).

Texts: 1. Ellis and Gulick
2. Xerox pages at Kinko & Target.

The good doctor's office is 218 Love
office hrs: M-F 12:30-1:15
& he is around most afternoons

Tests & dates: 1 hour closed book tests on thurs's
1. JAN 23 2. FEB 13 3. MAR 6 4. MAR 27 5. TUES APR 15
Final is at 10am - Noon Tues Apr 22, 1986

Grades ABCD are given on the classic 90, 80, 70, 60 scale. The tests are 1/8 each, the final is 1/4, the remaining 1/8 comes from HW (25%) and TP (75%).

HW: Given Daily and due the next class meeting. Each assignment is worth one point and represents the amount attempted. Your HW score = min (100%, your score/total poss x.90).

TP: Given once a week and due a week later. These have special rules (below) graded on 0..10. Your TP score = aver of ~~the~~ your best 2/3's. You must say what you are doing

RULES 1. THEY MUST BE YOUR OWN WORK.
2. must be in INK.
3. do NOT use both sides of the paper.
4. must be on 8½ by 11 paper.
5. addition pages clipped or stapled together.

LATE WORK isn't accepted, nor are there MAKE UP tests, extra credit material is NOT available.

CONTENT: all Xerox, Ch's 1 - 6 & parts of 7 & 8 in Ellis & Gulick.

AL 1 TEST 5 Sp86 show ALL work for credit by _____
each problem worth 10pts. Read CAREFULLY SS# _____

1. $\int x \sin 2x\,dx =$ $-\frac{1}{2}x\cos 2x - \int -\frac{1}{2}\cos 2x\,dx$

$u = x \quad dv = \sin 2x$

$du = dx \quad v = -\frac{1}{2}\cos 2x$

$= -\frac{1}{2}x\cos 2x + \frac{1}{4}\sin 2x + C$

2. $\int \ln 3x\,dx =$ $x\ln 3x - \int dx = x\ln 3x - x + C$

$u = \ln 3x \quad dv = dx$

$du = \frac{1}{3x}\cdot 3\,dx \quad v = x$

3. Find the area between $y = x^2 - 1$ and the x-axis on the interval $[0,1]$

$$\int_0^1 0 - (x^2-1)\,dx = \int_0^1 1 - x^2\,dx = x\Big|_0^1 - \frac{x^3}{3}\Big|_0^1$$

$$= (1-0) - (\tfrac{1}{3} - 0) = \frac{2}{3}$$

4. Find the equation of the tangent line to $y = \arctan\frac{x}{4}$ at $x = 4\sqrt{3}$. Simplify your answer to remove any arctan's

$y = \arctan\frac{4\sqrt{3}}{4} = \arctan\sqrt{3} = \frac{\pi}{3}$

$y' = \frac{1}{1+\frac{x^2}{16}}\cdot\frac{1}{4}$ @ $4\sqrt{3} = \frac{1}{1+\frac{16\cdot 3}{16}}\cdot\frac{1}{4} = \frac{1}{16}$

$$y - \pi/3 = \frac{1}{16}(x - 4\sqrt{3})$$

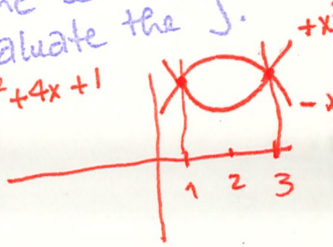
5&6 are about the region S which is between the curves $f(x) = x^2 - 4x + 7$ and $g(x) = -x^2 + 4x + 1$

5. Write an integral which is the volume of the solid obtained by rotating S about the x-axis. do NOT evaluate the $\int$.

$x^2 - 4x + 7 = -x^2 + 4x + 1$

$2x^2 - 8x + 6 = 0$

$2(x-3)(x-1)$



$$\int_1^3 \pi(-x^2+4x+1)^2 - \pi(x^2-4x+7)^2\,dx$$

6. write an integral which is the volume of the solid obt by rotating S about the y-axis. do NOT evaluate the $\int$.

$$\int_1^3 2\pi x\left[(-x^2+4x+1) - (x^2-4x+7)^{\text{2}}\right]dx$$

7. $\int_1^{\frac{5}{2}} \frac{3x+7}{2x-6}\,dx = \int_{-4}^{-1} \frac{3(\frac{u}{2}+3)+7}{u}\,\frac{du}{2} = \int_{-4}^{-1} \frac{3}{4} + \frac{8}{u}\,du$

$u = 2x-6 \quad x = \frac{1}{2}u+3$

$du = 2dx \quad dx = \frac{1}{2}du$

$x = 1 \quad u = -4$

$x = \frac{5}{2} \quad u = -1$

$= \frac{3}{4}u\Big|_{-4}^{-1} + 8\ln|u|\Big|_{-4}^{-1}$

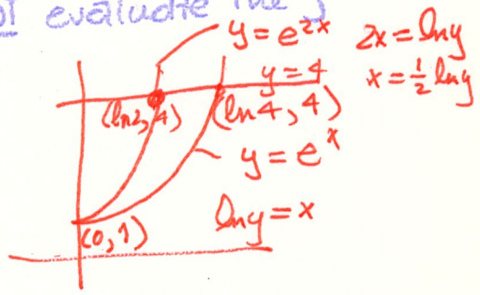
$= \frac{3}{4}(-1+4) + 8(\ln 1 - \ln 4)$

$= \frac{9}{4} - 8\ln 4$

8 & 9 are about the area of the bounded region R between the graphs $y=4$, $y=e^x$ and $y=e^{2x}$

8. Without interchanging x & y, write an integral with respect to dy which is the area of R. do NOT evaluate the $\int$

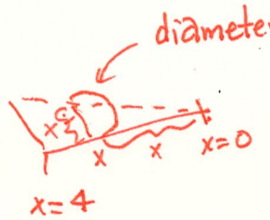
$$\int_1^4 \ln y - \frac{1}{2}\ln y\,dy$$



9. Without interchanging x & y, write an integral with respect to dx which is the area of R. do NOT evaluate the $\int$.

$$\int_0^{\ln 2} e^{2x} - e^x\,dx + \int_{\ln 2}^{\ln 4} 4 - e^x\,dx$$

10. Find the volume V of the solid S with the given info about S's cross sections. The base of S is an isosceles right triangle whose legs L_1 & L_2 are each 4 units long. Any cross section perpendicular both to L_1 and the base is semicircular.



$$\int_0^4 A(x)\,dx = \int_0^4 \frac{1}{2}\pi\left(\frac{x}{2}\right)^2 dx$$

$$= \frac{\pi}{8}\int_0^4 x^2\,dx = \frac{\pi}{8}\,\frac{x^3}{3}\Big|_0^4$$

$$= \frac{8\pi}{3}$$

FINAL TEST I — SPRING 86

MAE 2311 Sec 11

NAME _____

ID. NO _____

Show ALL work for credit, be neat.
All problems worth 10 points

1. Find $\lim_{x \to 4} \frac{x^2+2x-15}{x^2-4x-12}$

1. P1* (17, 1, 2, 1 | 1, 1, 0 →)

170
9
16
7
6
5
213

$\frac{213}{230} \approx 92.6$ ✓

~~87.0%~~

$\frac{21}{23}$ 91.3% passed

2. $y = 13x^{13} + 8x^3 + \frac{1}{2}\sqrt[4]{x} + \sin 5x + 31^\pi$. Find y'

3 P3 (7, 0, 4, 8 | 1, 1, 0, 2 →)

70
32
56
6
5
6
175

$\frac{175}{230} \approx 76.1$ ✓

$\frac{19}{23}$ 82.6% passed.

3. H is a positive infinite. Find the standard part of $\frac{5H^3+7H^2+21H+2}{100-200H+360H^2-3H^3}$

5 P4* (10, 4, 1 → 4, 4)

100
36
8
4
148

$\frac{148}{230} \approx 64.3$ ✓

AA 1

$\frac{15}{23}$ 65.2% passed

4. Find $\lim_{x \to 3^-} \frac{x^2-9}{x^2-x-6}$

2. P1* (16, 4, 1, 0 | 1, ↔, ↔, ↔)

160
36
8
6
2
212

$\frac{212}{230}$ 92.2% ✓

$\frac{21}{23}$ 91.3% passed

5. Find the equation of the tangent line to $y = \frac{3x^2+4}{x^2-4}$ at $x = 5$

7. P6* (2, 0, 5, 1 | 2, 1, 2, 6, 4, 0, 0)

20
40
7
12
5
8
18
8
118

$\frac{118}{230} \approx 51.3\%$

$\frac{8}{23}$ 34.8%

6. Find $\lim_{x \to 5^-} \frac{x^3-3x^2+2x}{x^2+5x-50}$

4 P4* (10, 2, 0, 3 | 3, 2, 0, 0, 2, 1, 0)

100
18
21
18
10
4
1
172

$\frac{172}{230} \approx 74.8\%$ ✓

$\frac{15}{23}$ 65.2% passed

7. The function $s = (\sin t + t^3)^{7/21} \cos^{21/7}(3t^2 + t^{-2})$ give distance as function of time. Find the velocity as a function of time.

8 P6*

(5,1,1,1,1,1,2,2,3,2,1,4)

50
9
8
7
6
10
8
9
4
1
112

$\frac{112}{230} \approx 48.7$

$\frac{8}{23} \approx$ 34.8% passed

8. H is a positive infinite. Find the standard part of $\sqrt{H + \sqrt{H}} - \sqrt{H}$

10 P9*

(0,0,2,2,0,1,0,2,3,4,10)

112
8
10
6
6
4
34

$\frac{37}{230} \approx$ 16.1%

$\frac{2}{23}$ 8.7% passed

9. For the function f(x) define to the right

A. Is f(x) cont. at x = -1. Why or Why not?

$$f(x) = \begin{cases} x^2 & \text{if } x < -1 \\ x+2 & \text{if } -1 < x < 2 \\ x^3 - 3 & \text{if } 2 \le x \end{cases}$$

6 P8*

(2,0,0,2,12,1,0,3,2,1,0)

B. Is f(x) cont. at x = 2. Why or Why not?

20
14
72
5
9
4
1
125

$\frac{125}{230} \approx 54.3$

$\frac{4}{23}$ 17.4%

10. A 30 ft pole has a bright lamp at its top. A 6 ft person is standing x ft away from the base of the pole.

9 P9*

A. Write an equation for the length of the person's shadow y in terms of x.

(1,0,0,1,3,2,1,8,3,4,0)

10
7
18
10
4
24
6
4
83

$\frac{83}{230} \approx 36.1\%$

B. Use the chain rule to find $\frac{dy}{dt}$ given $\frac{dx}{dt} = 3$ and $x = 40$

1395 ≈ 60.7%

$\frac{2}{23}$ 8.7% passed

CAL I TEST 2 each prob worth 10 pts. done to the max = 6pts

Show ALL work for credit

SS NO: _____

1. Implicitly find and solve for dy/dx given $x^2y^2 + xy = 7$.

13/0/2/1/1/0/1/0/1/3/1

130
16
7
6
4
2
3
0
168

168/230 73.0%

2.

16/23 69.6% passed.

2. Find $f(t)$ given $f''(t) = 60t^2 + 6$, $f'(3) = 1000, f(-1) = 70$

11/0/5/1/1/0/0/2/1/2/0/1

110
40
7
8
3
4
0
172

172/230 74.8%

1.

17/23 73.9% passed

3. $V = hwl$ find dV/dt given $h = 3, w = 7, l = 5$, $\frac{dh}{dt} = -1$, $\frac{dw}{dt} = \frac{1}{2}$ and $\frac{dl}{dt} = 2$.

10/0—0/4/5/4

100
8
5
113

113/230 49.1%

9

10/23 43.5% passed

4. Find $a(t)$, the acceleration and $v(t)$, the velocity if the position at time t is given by $s(t) = \frac{t^2 - 4}{t^2 + 1}$

10/0/3/2/1/3/1/0/1/0/2

100
24
14
6
15
4
2
165

165/230 71.7%

3

15/23 65.2% passed

5. Find the equation of the tangent line to $x^4 + y^4 = 272$ at $(2, 4)$

4/0/3/3/3/0/1/5/3/1/0

40
24
21
18
4
15
6
129

129/230 56.1%

7

10/23 43.5% passed

6. Find the min & max VALUES of $g(s) = s^{12} + s^{-2}$ on $[1/4, 2]$ (if none say none)

5/0/2/4/0/5/1/5/0/0/1

50
16
28
25
4
15
138

138/230 60.8%

5

11/23 47.8% passed

7. Find the min & max VALUES of $(1+x^2)^{-1}$ on $(-10, +20)$ (if none, say none)

4/0/0/5/2/6/2/1/1/1/1

6

40
35
12
30
8
3
2
1
131

131/230 57.0%

9/23 39.1% passed

8. Use the tangent (or differential) to approximate $(10.1)^{100}$

12/0/2/0/0/0/1/4/0/6

4

120
16
4
6
146

146/230 63.5%

14/23 60.9% passed.

9. The function $f(x)$ has derivative

$f'(x) = (x+10)(x+8)^3(x+2)^2(x-2)^{-2}(x-8)(x-10)^2$

find all relative extrema (hilltops & valley bottoms) and tell where f is increasing & decreasing (i.e. which intervals)

2/3/1/3/3/1/4/0/4/2/0

8

20
27
8
21
18
5
16
8
2
125

125/230 54.3%

9/23 39.1% passed

10. A floor light (height zero) is moving toward a post. A man at 3 ft/min. On the other side of the man, 20 ft away is an infinitely tall wall. How fast is the height of the man's shadow on the wall increasing when the light is 30 ft from the wall.

0/1/0/2/1/2/3/5/5/2/2

10

9
14
6
10
12
15
10
2
78

78/230 33.9%

3/23 13.0% passed

CAL I Tests show ALL work for credit by
each problem worth 10 points

1. Find $\lim_{x \to -\infty} \frac{4 - 10x^2 + 3x^3}{5x^2 - 7x^3 - 2}$

1 (12, 0, 3, 3, 0, 1, 0000, 1)

120
24
21
5
170

$\frac{170}{200} \approx 85$

2. $\int_1^4 x^3 + 3\sqrt{x} + x^{-2} + 3\pi^2 \sin \pi x \, dx =$

7 (3, 0, 4, 6, 1, 1, 4, 0, 1, 1, 1)

10
32
42
6
5
8
2
1
106

$\frac{106}{200} \times 53$

3. $\int t^2 (3t^3 + 100)^{-200} \, dt =$

5 (4, 3, 3, 1, 1, 0, 0, 1, 5, 2, 0)

40
27
24
7
6
3
10
2
119

$\frac{119}{200} \times 59.5$

4. find $\frac{dw}{dz}$ if $w = e^{\sin^2 z} \ln(\sqrt{1+z^2})$

3 (8, 1, 0, 3, 2, 1, 0, 0, 4, 0, 1)

80
9
21
12
5
8
135

$\frac{135}{200} \approx 67.5$

5. Find the equation of the tangent line to $y = \ln x^3$ at $x = e$. Your answer should have NO ln's or log's

4 (8, 0, 1, 1, 0, 4, 4, 0, 1, 1, 0)

80
8
7
20
16
2
1
134

$\frac{134}{200} \approx 67$

6. $\int_3^8 \frac{3x+4}{\sqrt{x+1}} \, dx =$

9 (2, 0, 2, 0, 0, 3, 0, 2, 2, 0, 9)

20
15
15
6
4
61

$\frac{61}{200} \approx 30.5$

170
106
119
135
134
61
725

CIT3P2

7. Find the points of inflection and the intervals where $f(x)$ is smiling (concave up) and frowning (concave down) where $f(x) = 3x^5 - 10x^4 + 10x^3 - 17x + 55$

2 (12,0,0,4,1,2,0,1,0,0,0)

120
28
6
10
3
167

$\frac{167}{200} \approx 83.5$

8. $F(x) = -5\int_{x^2}^{2} (t^3 + \ln t)^{101}\, dt$ find $F'(x)$

(no $\int$'s allowed in answer ~~allowed~~)

20
16
21
10
4
3
6
2
82

$\frac{82}{200} \approx 41$

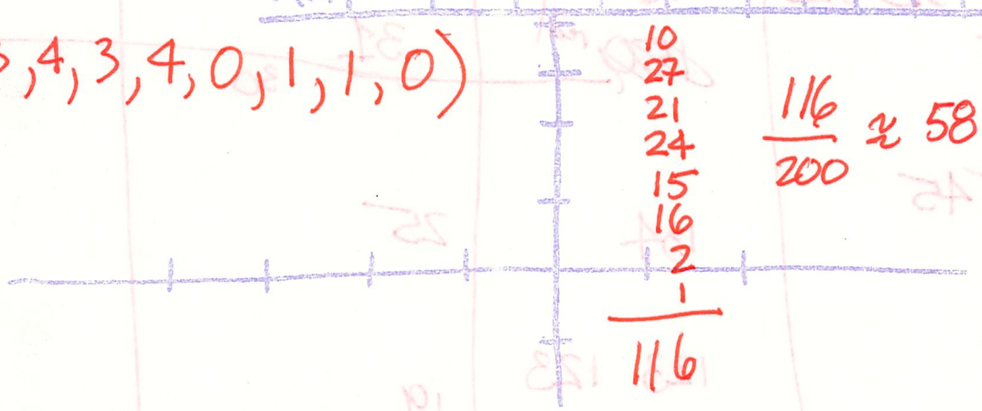
8 (2,0,2,3,0,2,1,1,3,2,4)

9. Graph the function $f(x)$ given the info to right, ("funny" pts are $-3, -2, -1, 0, 1$) and means undefined

$\lim_{x \to \infty} f(x) = 1$ $\lim_{x \to -\infty} f(x) = -1$

x	$-3\frac{1}{2}$	-3	$-2\frac{1}{2}$	-2	$-1\frac{1}{2}$	-1	$-\frac{1}{2}$	0	$\frac{1}{2}$	1	$1\frac{1}{2}$
$f(x)$	?	0	?	1	?	2	?	3	?	2	?
$f'(x)$	+	und	+	+	+	+	+	0	−	−	−
$f''(x)$	+	und	−	0	+	0	−	−	−	0	+

(1,3,0,3,4,3,4,0,1,1,0)



10
27
21
24
15
16
2
1
116

$\frac{116}{200} \approx 58$

6

10. Find the dimensions of the rectangle of maximum area which can be inscribed in a semi-circle of radius R.

0th

(0,1,1,0,2,0,2,1,6,5,2)

9
8
12
8
3
12
5
57

$\frac{57}{200} \times 28.5$

0

725
167
82
116
57
1147

57.35

CAL 1 TEST 5 Sp86 show ALL work for credit by _____
each problem worth 10pts. Read CAREFULLY 55% _____

1. $\int x \sin 2x \, dx =$

(10,1,0,1,1,1,0,0,1,2,0)

100
9
7
6
5
2
2
131

$\frac{131}{170}$ 77.1%

(1)

2. $\int \ln 3x \, dx =$

(7,3,0,3,0,1,0,0,0,1,2)

70
27
21
5
1
124

$\frac{124}{170} \approx 72.9\%$

(2)

3. Find the area between $y = x^2 - 1$ and the x-axis on the interval $[0,1]$

(9,1,0,3,0,0,0,0,0,4,0)

90
9
21
4
124

$\frac{124}{170} \approx 72.9\%$

(2)

4. Find the equation of the tangent line to $y = \arctan\frac{x}{4}$ at $x = 4\sqrt{3}$. Simplify your answer to remove any arctan's

(0,0,5,1,5,0,2,2,1,1)

40
7
30
6
4
1
88

$\frac{88}{170} \approx 51.8\%$

(6)

5&6 are about the region S which is between the curves $f(x) = x^2 - 4x + 7$ and $g(x) = -x^2 + 4x + 1$

5. Write an integral which is the volume of the solid obtained by rotating S about the x-axis. do NOT evaluate the $\int$.

(3,1,2,1,3,5,0,1,1,0,0)

30
9
16
7
18
25
3
2
110

$\frac{110}{170} \approx 64.7\%$

(4)

6. Write an integral which is the volume of the solid obtained by rotating S about the y-axis. do NOT evaluate the $\int$.

(2,0,4,0,6,0,0,2,2,1,0)

20
32
36
6
4
1
99

$\frac{99}{170} \approx 58.2\%$

(5)

676

7. $\int_1^{\frac{5}{2}} \frac{3x+7}{2x-6}\,dx$

(7)

(2,0,1,1,1,6,1,2,1,2,0)

20
8
7
6
30
4
6
2
2
85

$\frac{85}{170} \approx 50.0\%$

8 & 9 are about the area of the bounded region R between the graphs $y=4$, $y=e^x$ and $y=e^{2x}$

8. Without interchanging x & y, write an integral with respect to dy which is the area of R. do NOT evaluate the $\int$

(9)

(2,0,1,1,1,0,1,1,3,3,4)

20
8
7
6
4
3
6
3
57

$\frac{57}{170} \approx 33.5\%$

9. Without interchanging x & y, write an integral with respect to dx which is the area of R. do NOT evaluate the $\int$.

(8)

(4,0,2,0,1,2,1,0,1,3,3)

40
16
6
10
4
2
3
81

$\frac{81}{170} \approx 47.6\%$

10. Find the volume V of the solid S with the given info about S's cross sections. The base of S is an isosceles right triangle whose legs L_1 & L_2 are each 4 units long. Any cross section perpendicular both to L_1 and the base is semicircular.

(10)

(0,0,0,0,0,0,0,1,2,8,6)

3
4
8
15

$\frac{15}{170} \approx 8.8\%$

$\frac{914}{1700} \approx 53.8\%$

Calc I: optional midterm. Show ALL work. Graded by _____

all problems worth 10 points

Sno. _____

1. $\int e^{2x} + 4x^4 + 3x^{-1} + x^{-\pi} + \sin 5x \, dx =$

2. Express $\frac{dy}{dx}$ without "$\int$" signs if $y = \int_{e^{\pi}}^{x} \ln(\tan(e^{\sqrt{5}t}))\,dt$

3. find $\int_0^{\pi/2} e^{\sin^2 t} \sin t \cos t \, dt$

4. find the equation of the tangent line to $y = \tan x$ at $x = \pi/3$.

5. Find the acceleration $a(t)$ and velocity $v(t)$ if the position at time t is given by $e^{t \ln t}$.

6. find $\int_3^{11} \frac{4t - 7}{(2t+3)^{3/2}} \, dt$

7. Use the tangent line to approx $\ln(1.05)$

8. For $f(x)$ defined to the right and $P = \{-2, 0, 2\}$ find A. $\int_{-2}^{2} f(x)dx$ B. $L_f(P)$ and C. $U_f(P)$

$$f(x) = \begin{cases} 2, \text{if } x \leq -\frac{3}{2} \\ 1, \text{if } -\frac{3}{2} < x < \frac{3}{2} \\ 3, \text{if } \frac{3}{2} \leq x \end{cases}$$

9. Graph the equation $f(x) = e^x - e^{-x}$. Label all rel extremd and points of inflection.

10. Find the point on $y = x^2$ nearest to $(16, 1/2)$.