1. Let $f(x)$ be a differentiable function of x. Which of the following expressions is the derivative of the function $g(x) = \dfrac{f(x)}{x^2}$?

(a) $\dfrac{2xf(x) - x^2 f'(x)}{x^4}$ (b) $2xf(x) - \dfrac{f'(x)}{x^3}$ (c) $-2x^{-3}f'(x) + x^{-2}f(x)$ (d) $\dfrac{x^2 f'(x) - 2xf(x)}{x^4}$

(e) $2xf(x) + \dfrac{f'(x)}{x^3}$

2. Assume $x \in \left[0, \dfrac{\pi}{2}\right]$. If $\sin x = \dfrac{3}{5}$ then $\tan x =$

(a) $\dfrac{4}{3}$ (b) $\dfrac{5}{4}$ (c) $\dfrac{4}{5}$ (d) $\dfrac{5}{3}$ (e) $\dfrac{3}{4}$

3. Suppose that $f = g \circ h + h \circ g$, $g(0) = 1$, $h(0) = 2$, $g'(0) = 3$, $g'(2) = 5$, $h'(0) = 6$, $h'(1) = 7$ then $f'(0) =$

(a) 51 (b) 41 (c) 31 (d) 11 (e) 21

4. Which of the following quantities is equal to

$$\lim_{h \to 0} \frac{(2+h)^3 - 8}{h}$$

(a) 0 (b) $3h^2$ (c) 1 (d) $f'(2), f(x) = x^3$ (e) $f'(h), f(x) = x^2$

5. The volume V of a cube is increasing at a rate of 300cm^3 per minute. How fast is the length L of each side increasing where $L = 10$ cm ?

(a) 1cm/min (b) 100cm/min (c) 30cm/min (d) 3cm/min (e) 10cm/min

6. Compute the indefinite integral

$$\int \frac{2x}{(x^2+1)^5}dx =$$

(a) $\frac{(x^2+1)^4}{4}+C$ (b) $\frac{1}{x^4}+C$ (c) $-\frac{(x^2+1)^4}{4}+C$ (d) $\frac{1}{4(x^2+1)^4}+C$

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

7. The function $f(x)=\frac{x^2}{x^2-1}$ is increasing on the interval(s):

(a) $(-1,0)\cup(0,1)$ (b) $(-\infty,0)$ (c) $(-1,1)$ (d) $(-\infty,-1)\cup(-1,0)$ (e) $(0,1)\cup(1,\infty)$

8. Which of the following is $\dfrac{f(x+h)-f(x)}{h}$ if $f(x) = x^2 + 7x$? Note that you are not being asked to compute the limit as $h \to 0$.

(a) $2x + 7$ (b) $2x + 7x + h$ (c) $2x + 7 + h$ (d) $2x + 7h$ (e) $2xh + h^2$

9. Let

$$f(x) = (\sin(2x))^3.$$

Which of the following is $f'(x)$?

(a) $-6(\sin(2x))^2 \cos(2x)$ (b) $6(\sin(2x))^2 \cos(2x)$ (c) $3(\sin(2x))^2 \cos(2x)$ (d) $(\sin(2x))^2$

(e) $3\sin(x)\cos(x)$

10. Which of the following equals

$$\int (\cos(x)+5)^3 \sin(x)dx \ ?$$

(a) $-\dfrac{(\cos(x)+5)^4}{5}$ (b) $-3(\cos(x)+5)^2$ (c) $-\dfrac{(\cos(x)+5)^4}{4}+C$ (d) $\dfrac{(\cos(x)+5)^4}{4}$

(e) $\dfrac{(\cos(x)+5)^4}{4}+C$

11. If $f(x)=x^2$, $0\le x\le 6$, find the Riemann sum with $n=3$ taking the sample points to be Midpoints.

(a) 70 (b) 74 (c) 35 (d) 18 (e) 9

12. Evaluate the integral $\displaystyle\int_0^{2\pi}(\sin x-\cos x)\,dx$. The integral is equal to

(a) 0 (b) 2 (c) -1 (d) 1 (e) -2

13. Find the area enclosed by the curves $y = x$ and $y = x^3$, between $x = 0$ and $x = 1$.

(a) $\frac{3}{4}$ (b) 1 (c) $-\frac{1}{4}$ (d) $\frac{1}{2}$ (e) $\frac{1}{4}$

14. A particle is moving in a straight line with position function $s(t) = \frac{t^3}{6}$. What is the average velocity over the time period $[1, 3]$.

(a) 4 (b) 13 (c) $\frac{13}{6}$ (d) $\frac{9}{2}$ (e) $\frac{13}{3}$

15. Find the equation of the tangent line to the curve $x^2 + y^2 = 169$ at the point $(12, 5)$.

(a) $y = -2x + 13$ (b) $y = -2.4x + 33.8$ (c) $y = \frac{5}{12}x$ (d) $y = 2.4x + 23.8$ (e) $y = \frac{-5}{12}x$

16. Find horizontal and vertical asymptotes to $f(x) = \frac{1}{x} + \frac{1}{x+1}$.

(a) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = -1$

(b) vertical asymptotes at $x = 0$ and $x = 1$, horizontal asymptotes at ∞

(c) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = 0$

(d) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 1$

(e) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 0$

17. Evaluate the integral $\int_0^1 \sqrt[3]{x}(x-1)dx$.

(a) $\frac{-3}{7}$ (b) $\frac{-9}{28}$ (c) $\frac{3}{7}$ (d) -6 (e) $\frac{11}{28}$

18. Evaluate the integral $\int (1-x)\sqrt{2x-x^2}dx$.

(a) $(2x-x^2)^{\frac{3}{2}}+C$ (b) $\frac{1}{3}(2x-x^2)^{\frac{3}{2}}+C$ (c) $(2-x)^{\frac{3}{2}}+C$ (d) $-(2x-x^2)^{-\frac{1}{2}}+C$

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

19. Which of the following numbers is equal to the value of the limit

$$\lim_{x\to 4}\frac{\sqrt{x}-2}{x-4}$$

(a) 2 (b) 4 (c) 1/2 (d) 1/4 (e) 1

20. Which of the following limits is equal to the derivative of $f(x) = \dfrac{1}{\sqrt{x+1}}$ at $x = 3$?

(a) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$ (b) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$ (c) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+x+h}} - \frac{1}{2}}{h}$

(d) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$ (e) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$

21. Which one of the following functions $F(x)$ satisfies $F'(x) = 1/x$ for $x > 0$?

(a) $F(x) = \displaystyle\int_1^x \frac{1}{t+1}dt - 1$ (b) $F(x) = \dfrac{1}{x^2}$ (c) $F(x) = \displaystyle\int_1^x \frac{1}{t}dt$ (d) $F(x) = \displaystyle\int_1^x -\frac{1}{t^2}dt$

(e) $F(x) = -\dfrac{1}{x^2}$

22. The product of two positive numbers is 900 . What is the minimum their **sum** can be?

(a) 30 (b) 60 (c) -30 (d) -60 (e) 0

23. Evaluate the integral $\int_{-1}^{0} (x+2)^3\,dx$

(a) $\frac{1}{4}$ (b) $\frac{15}{4}$ (c) 7 (d) $\frac{7}{3}$ (e) $\frac{15}{16}$

24. A balloon is rising vertically from a point A . It has constant speed of 5m/sec. A girl is watching from a position exactly 80m from A . How fast is the distance between the girl and the balloon increasing when the balloon is 60m high?

(a) $11\frac{m}{s}$ (b) $5\frac{m}{s}$ (c) $9\frac{m}{s}$ (d) $3\frac{m}{s}$ (e) $7\frac{m}{s}$

25. On what intervals is $f(x) = \frac{1}{4x-7}$ concave up?

(a) $\left(-\infty, \frac{7}{4}\right)$ (b) $\left(\frac{7}{4}, \infty\right)$ (c) $(-\infty, \infty)$ (d) $\left(-\infty, \frac{7}{4}\right) \cup \left(\frac{7}{4}, \infty\right)$ (e) $(0, \infty)$

Version 1 color:

_____

Math 119 Calculus, Final

December 15, 2000

This Examination contains **25** problems, worth a total of **150** points, on **11** sheets of paper including the front cover. Each Problem is worth **6** points. Please cross $\boxed{\times}$ the correct answers for the multiple choice questions. Books and notes are not allowed. You may use your calculator.

Name: _____

Prof: _____

1.	a	b	c	•	e	
2.	a	b	c	d	•	
3.	•	b	c	d	e	
4.	a	b	c	•	e	
5.	•	b	c	d	e	
6.	a	b	c	d	•	
7.	a	b	c	•	e	
8.	a	b	•	d	e	
9.	a	•	c	d	e	
10.	a	b	•	d	e	
11.	•	b	c	d	e	
12.	•	b	c	d	e	
13.	a	b	c	d	•	
14.	a	b	•	d	e	
15.	a	•	c	d	e	
16.	a	b	c	d	•	
17.	a	•	c	d	e	
18.	a	•	c	d	e	
19.	a	b	c	•	e	
20.	a	b	c	d	•	
21.	a	b	•	d	e	
22.	a	•	c	d	e	
23.	a	•	c	d	e	
24.	a	b	c	•	e	
25.	a	•	c	d	e	

Total _____

4a's 7b's 4c's 5d's 5e's

Math 119 Calculus, Final

December 15, 2000

This Examination contains **25** problems, worth a total of **150** points, on **11** sheets of paper including the front cover. Each Problem is worth **6** points. Please cross $\boxed{\times}$ the correct answers for the multiple choice questions. Books and notes are not allowed. You may use your calculator.

Name: _____

Prof: _____

1.	a	b	c	d	e
2.	a	b	c	d	e
3.	a	b	c	d	e
4.	a	b	c	d	e
5.	a	b	c	d	e
6.	a	b	c	d	e
7.	a	b	c	d	e
8.	a	b	c	d	e
9.	a	b	c	d	e
10.	a	b	c	d	e
11.	a	b	c	d	e
12.	a	b	c	d	e
13.	a	b	c	d	e
14.	a	b	c	d	e
15.	a	b	c	d	e

16.	a	b	c	d	e
17.	a	b	c	d	e
18.	a	b	c	d	e
19.	a	b	c	d	e
20.	a	b	c	d	e
21.	a	b	c	d	e
22.	a	b	c	d	e
23.	a	b	c	d	e
24.	a	b	c	d	e
25.	a	b	c	d	e

Total _____

Sign your name:

1. Let $f(x)$ be a differentiable function of x. Which of the following expressions is the derivative of the function $g(x) = \dfrac{f(x)}{x^2}$?

(a) $2xf(x) + \dfrac{f'(x)}{x^3}$ (b) $2xf(x) - \dfrac{f'(x)}{x^3}$ (c) $-2x^{-3}f'(x) + x^{-2}f(x)$ (d) $\dfrac{x^2f'(x) - 2xf(x)}{x^4}$

(e) $\dfrac{2xf(x) - x^2f'(x)}{x^4}$

2. Assume $x \in \left[0, \dfrac{\pi}{2}\right]$. If $\sin x = \dfrac{3}{5}$ then $\tan x =$

(a) $\dfrac{4}{5}$ (b) $\dfrac{5}{3}$ (c) $\dfrac{4}{3}$ (d) $\dfrac{3}{4}$ (e) $\dfrac{5}{4}$

3. Suppose that $f = g \circ h + h \circ g$, $g(0) = 1$, $h(0) = 2$, $g'(0) = 3$, $g'(2) = 5$, $h'(0) = 6$, $h'(1) = 7$ then $f'(0) =$

(a) 21 (b) 31 (c) 51 (d) 11 (e) 41

4. Which of the following quantities is equal to

$$\lim_{h \to 0} \frac{(2+h)^3 - 8}{h}$$

(a) 1 (b) 0 (c) $f'(h), f(x) = x^2$ (d) $f'(2), f(x) = x^3$ (e) $3h^2$

5. The volume V of a cube is increasing at a rate of 300cm^3 per minute. How fast is the length L of each side increasing where $L = 10$ cm ?

(a) 1cm/min (b) 100cm/min (c) 10cm/min (d) 3cm/min (e) 30cm/min

6. Compute the indefinite integral

$$\int \frac{2x}{(x^2+1)^5}dx =$$

(a) $-\dfrac{1}{4(x^2+1)^4}+C$ (b) $-\dfrac{(x^2+1)^4}{4}+C$ (c) $\dfrac{1}{x^4}+C$ (d) $\dfrac{1}{4(x^2+1)^4}+C$

(e) $\dfrac{(x^2+1)^4}{4}+C$

7. The function $f(x)=\dfrac{x^2}{x^2-1}$ is increasing on the interval(s):

(a) $(-1,1)$ (b) $(0,1)\cup(1,\infty)$ (c) $(-\infty,0)$ (d) $(-1,0)\cup(0,1)$ (e) $(-\infty,-1)\cup(-1,0)$

8. Which of the following is $\dfrac{f(x+h)-f(x)}{h}$ if $f(x) = x^2 + 7x$? Note that you are not being asked to compute the limit as $h \to 0$.

(a) $2xh + h^2$ (b) $2x + 7 + h$ (c) $2x + 7h$ (d) $2x + 7$ (e) $2x + 7x + h$

9. Let

$$f(x) = (\sin(2x))^3.$$

Which of the following is $f'(x)$?

(a) $3(\sin(2x))^2 \cos(2x)$ (b) $(\sin(2x))^2$ (c) $-6(\sin(2x))^2 \cos(2x)$ (d) $3\sin(x)\cos(x)$

(e) $6(\sin(2x))^2 \cos(2x)$

10. Which of the following equals

$$\int (\cos(x)+5)^3 \sin(x)dx \ ?$$

(a) $-3(\cos(x)+5)^2$ (b) $-\frac{(\cos(x)+5)^4}{4}+C$ (c) $-\frac{(\cos(x)+5)^4}{5}$ (d) $\frac{(\cos(x)+5)^4}{4}+C$

(e) $\frac{(\cos(x)+5)^4}{4}$

11. If $f(x)=x^2$, $0 \le x \le 6$, find the Riemann sum with $n=3$ taking the sample points to be Midpoints.

(a) 9 (b) 18 (c) 70 (d) 74 (e) 35

12. Evaluate the integral $\int_0^{2\pi} (\sin x - \cos x)\, dx$. The integral is equal to

(a) -1 (b) -2 (c) 0 (d) 1 (e) 2

13. Find the area enclosed by the curves $y = x$ and $y = x^3$, between $x = 0$ and $x = 1$.

(a) $\frac{3}{4}$ (b) $-\frac{1}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$ (e) 1

14. A particle is moving in a straight line with position function $s(t) = \frac{t^3}{6}$. What is the average velocity over the time period $[1, 3]$.

(a) 13 (b) $\frac{13}{6}$ (c) $\frac{13}{3}$ (d) 4 (e) $\frac{9}{2}$

15. Find the equation of the tangent line to the curve $x^2 + y^2 = 169$ at the point $(12, 5)$.

(a) $y = \frac{-5}{12}x$ (b) $y = 2.4x + 23.8$ (c) $y = -2.4x + 33.8$ (d) $y = \frac{5}{12}x$ (e) $y = -2x + 13$

16. Find horizontal and vertical asymptotes to $f(x) = \frac{1}{x} + \frac{1}{x+1}$.

(a) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = 0$

(b) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 0$

(c) vertical asymptotes at $x = 0$ and $x = 1$, horizontal asymptotes at ∞

(d) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 1$

(e) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = -1$

17. Evaluate the integral $\int_0^1 \sqrt[3]{x}(x-1)dx$.

(a) $\frac{-9}{28}$ (b) -6 (c) $\frac{11}{28}$ (d) $\frac{-3}{7}$ (e) $\frac{3}{7}$

18. Evaluate the integral $\int (1-x)\sqrt{2x-x^2}dx$.

(a) $(2-x)^{\frac{3}{2}}+C$ (b) $\frac{1}{3}(2x-x^2)^{\frac{3}{2}}+C$ (c) $(2x-x^2)^{-\frac{1}{2}}+C$ (d) $-(2x-x^2)^{-\frac{1}{2}}+C$

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

19. Which of the following numbers is equal to the value of the limit

$$\lim_{x\to 4}\frac{\sqrt{x}-2}{x-4}$$

(a) 1/4 (b) 1/2 (c) 2 (d) 1 (e) 4

20. Which of the following limits is equal to the derivative of $f(x) = \dfrac{1}{\sqrt{x+1}}$ at $x = 3$?

(a) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+x+h}} - \frac{1}{2}}{h}$ (b) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$ (c) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$

(d) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$ (e) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$

21. Which one of the following functions $F(x)$ satisfies $F'(x) = 1/x$ for $x > 0$?

(a) $F(x) = \displaystyle\int_1^x \frac{1}{t+1}dt - 1$ (b) $F(x) = -\dfrac{1}{x^2}$ (c) $F(x) = \dfrac{1}{x^2}$ (d) $F(x) = \displaystyle\int_1^x -\frac{1}{t^2}dt$

(e) $F(x) = \displaystyle\int_1^x \frac{1}{t}dt$

22. The product of two positive numbers is 900 . What is the minimum their **sum** can be?

(a) 0 (b) -30 (c) 60 (d) 30 (e) -60

23. Evaluate the integral $\int_{-1}^{0} (x+2)^3\,dx$

(a) $\frac{1}{4}$ (b) $\frac{15}{16}$ (c) 7 (d) $\frac{15}{4}$ (e) $\frac{7}{3}$

24. A balloon is rising vertically from a point A . It has constant speed of 5m/sec. A girl is watching from a position exactly 80m from A . How fast is the distance between the girl and the balloon increasing when the balloon is 60m high?

(a) $5\frac{m}{s}$ (b) $3\frac{m}{s}$ (c) $9\frac{m}{s}$ (d) $11\frac{m}{s}$ (e) $7\frac{m}{s}$

25. On what intervals is $f(x) = \frac{1}{4x-7}$ concave up?

(a) $\left(-\infty, \frac{7}{4}\right)$ (b) $\left(-\infty, \frac{7}{4}\right) \cup \left(\frac{7}{4}, \infty\right)$ (c) $(-\infty, \infty)$ (d) $(0, \infty)$ (e) $\left(\frac{7}{4}, \infty\right)$

Version 2 color:

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Math 119 Calculus, Final

December 15, 2000

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Name: _____

Prof: _____

1.	a	b	c	•	e
2.	a	b	c	•	e
3.	a	b	•	d	e
4.	a	b	c	•	e
5.	•	b	c	d	e
6.	•	b	c	d	e
7.	a	b	c	d	•
8.	a	•	c	d	e
9.	a	b	c	d	•
10.	a	•	c	d	e
11.	a	b	•	d	e
12.	a	b	•	d	e
13.	a	b	•	d	e
14.	a	•	c	d	e
15.	a	b	•	d	e

16.	a	•	c	d	e
17.	•	b	c	d	e
18.	a	•	c	d	e
19.	•	b	c	d	e
20.	a	b	c	d	•
21.	a	b	c	d	•
22.	a	b	•	d	e
23.	a	b	c	•	e
24.	a	•	c	d	e
25.	a	b	c	d	•

Total _____

4a's 6b's 6c's 4d's 5e's

1. Let $f(x)$ be a differentiable function of x. Which of the following expressions is the derivative of the function $g(x) = \dfrac{f(x)}{x^2}$?

(a) $-2x^{-3}f'(x) + x^{-2}f(x)$ (b) $\dfrac{x^2f'(x) - 2xf(x)}{x^4}$ (c) $\dfrac{2xf(x) - x^2f'(x)}{x^4}$ (d) $2xf(x) + \dfrac{f'(x)}{x^3}$

(e) $2xf(x) - \dfrac{f'(x)}{x^3}$

2. Assume $x \in \left[0, \dfrac{\pi}{2}\right]$. If $\sin x = \dfrac{3}{5}$ then $\tan x =$

(a) $\dfrac{3}{4}$ (b) $\dfrac{5}{4}$ (c) $\dfrac{4}{5}$ (d) $\dfrac{4}{3}$ (e) $\dfrac{5}{3}$

3. Suppose that $f = g \circ h + h \circ g$, $g(0) = 1$, $h(0) = 2$, $g'(0) = 3$, $g'(2) = 5$, $h'(0) = 6$, $h'(1) = 7$ then $f'(0) =$

(a) 51 (b) 31 (c) 21 (d) 41 (e) 11

4. Which of the following quantities is equal to

$$\lim_{h \to 0} \frac{(2+h)^3 - 8}{h}$$

(a) 1 (b) $f'(2), f(x) = x^3$ (c) 0 (d) $3h^2$ (e) $f'(h), f(x) = x^2$

5. The volume V of a cube is increasing at a rate of 300cm^3 per minute. How fast is the length L of each side increasing where $L = 10$ cm ?

(a) 3cm/min (b) 30cm/min (c) 10cm/min (d) 1cm/min (e) 100cm/min

6. Compute the indefinite integral

$$\int \frac{2x}{(x^2+1)^5}dx =$$

(a) $\frac{(x^2+1)^4}{4}+C$ (b) $\frac{1}{x^4}+C$ (c) $-\frac{1}{4(x^2+1)^4}+C$ (d) $\frac{1}{4(x^2+1)^4}+C$

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

7. The function $f(x)=\frac{x^2}{x^2-1}$ is increasing on the interval(s):

(a) $(0,1)\cup(1,\infty)$ (b) $(-\infty,-1)\cup(-1,0)$ (c) $(-1,1)$ (d) $(-1,0)\cup(0,1)$ (e) $(-\infty,0)$

8. Which of the following is $\dfrac{f(x+h)-f(x)}{h}$ if $f(x) = x^2 + 7x$? Note that you are not being asked to compute the limit as $h \to 0$.

(a) $2xh + h^2$ (b) $2x + 7x + h$ (c) $2x + 7 + h$ (d) $2x + 7$ (e) $2x + 7h$

9. Let

$$f(x) = (\sin(2x))^3.$$

Which of the following is $f'(x)$?

(a) $6(\sin(2x))^2 \cos(2x)$ (b) $(\sin(2x))^2$ (c) $3(\sin(2x))^2 \cos(2x)$ (d) $-6(\sin(2x))^2 \cos(2x)$

(e) $3\sin(x)\cos(x)$

10. Which of the following equals

$$\int (\cos(x)+5)^3 \sin(x)dx \ ?$$

(a) $-\dfrac{(\cos(x)+5)^4}{5}$ (b) $-3(\cos(x)+5)^2$ (c) $\dfrac{(\cos(x)+5)^4}{4}+C$ (d) $\dfrac{(\cos(x)+5)^4}{4}$

(e) $-\dfrac{(\cos(x)+5)^4}{4}+C$

11. If $f(x)=x^2$, $0\le x\le 6$, find the Riemann sum with $n=3$ taking the sample points to be Midpoints.

(a) 35 (b) 74 (c) 9 (d) 70 (e) 18

12. Evaluate the integral $\displaystyle\int_0^{2\pi} (\sin x-\cos x)\,dx$. The integral is equal to

(a) 1 (b) 0 (c) 2 (d) -2 (e) -1

13. Find the area enclosed by the curves $y = x$ and $y = x^3$, between $x = 0$ and $x = 1$.

(a) 1 (b) $-\frac{1}{4}$ (c) $\frac{3}{4}$ (d) $\frac{1}{2}$ (e) $\frac{1}{4}$

14. A particle is moving in a straight line with position function $s(t) = \frac{t^3}{6}$. What is the average velocity over the time period $[1, 3]$.

(a) $\frac{13}{3}$ (b) $\frac{13}{6}$ (c) $\frac{9}{2}$ (d) 13 (e) 4

15. Find the equation of the tangent line to the curve $x^2 + y^2 = 169$ at the point $(12, 5)$.

(a) $y = -2x + 13$ (b) $y = 2.4x + 23.8$ (c) $y = -2.4x + 33.8$ (d) $y = \frac{-5}{12}x$ (e) $y = \frac{5}{12}x$

16. Find horizontal and vertical asymptotes to $f(x) = \frac{1}{x} + \frac{1}{x+1}$.

(a) vertical asymptotes at $x = 0$ and $x = 1$, horizontal asymptotes at ∞

(b) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = -1$

(c) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 1$

(d) vertical asymptotes at $x = 0$ and $x = -1$, horizontal asymptotes at $y = 0$

(e) vertical asymptotes at $x = 0$, horizontal asymptotes at $y = 0$

17. Evaluate the integral $\int_0^1 \sqrt[3]{x}(x-1)dx$.

(a) $\frac{-9}{28}$ (b) -6 (c) $\frac{11}{28}$ (d) $\frac{-3}{7}$ (e) $\frac{3}{7}$

18. Evaluate the integral $\int (1-x)\sqrt{2x-x^2}dx$.

(a) $(2-x)^{\frac{3}{2}}+C$ (b) $-(2x-x^2)^{-\frac{1}{2}}+C$ (c) $\frac{1}{3}(2x-x^2)^{\frac{3}{2}}+C$ (d) $(2x-x^2)^{-\frac{1}{2}}+C$

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

19. Which of the following numbers is equal to the value of the limit

$$\lim_{x\to 4}\frac{\sqrt{x}-2}{x-4}$$

(a) 2 (b) 1/2 (c) 4 (d) 1/4 (e) 1

20. Which of the following limits is equal to the derivative of $f(x) = \dfrac{1}{\sqrt{x+1}}$ at $x = 3$?

(a) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$ (b) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{1+x+h}} - \frac{1}{2}}{h}$ (c) $f'(3) = \lim_{h\to 0} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$

(d) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{1+h}} - \frac{1}{2}}{h}$ (e) $f'(3) = \lim_{h\to 3} \dfrac{\frac{1}{\sqrt{4+h}} - \frac{1}{2}}{h}$

21. Which one of the following functions $F(x)$ satisfies $F'(x) = 1/x$ for $x > 0$?

(a) $F(x) = -\dfrac{1}{x^2}$ (b) $F(x) = \displaystyle\int_1^x \frac{1}{t}dt$ (c) $F(x) = \displaystyle\int_1^x -\frac{1}{t^2}dt$ (d) $F(x) = \dfrac{1}{x^2}$

(e) $F(x) = \displaystyle\int_1^x \frac{1}{t+1}dt - 1$

22. The product of two positive numbers is 900 . What is the minimum their **sum** can be?

(a) -60 (b) 30 (c) 0 (d) -30 (e) 60

23. Evaluate the integral $\int_{-1}^{0} (x+2)^3\,dx$

(a) $\frac{15}{4}$ (b) $\frac{1}{4}$ (c) 7 (d) $\frac{7}{3}$ (e) $\frac{15}{16}$

24. A balloon is rising vertically from a point A . It has constant speed of 5m/sec. A girl is watching from a position exactly 80m from A . How fast is the distance between the girl and the balloon increasing when the balloon is 60m high?

(a) $11\frac{m}{s}$ (b) $7\frac{m}{s}$ (c) $5\frac{m}{s}$ (d) $9\frac{m}{s}$ (e) $3\frac{m}{s}$

25. On what intervals is $f(x) = \frac{1}{4x-7}$ concave up?

(a) $(-\infty, \infty)$ (b) $\left(\frac{7}{4}, \infty\right)$ (c) $\left(-\infty, \frac{7}{4}\right) \cup \left(\frac{7}{4}, \infty\right)$ (d) $(0, \infty)$ (e) $\left(-\infty, \frac{7}{4}\right)$

Version 3 color:

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Math 119 Calculus, Final

December 15, 2000

This Examination contains **25** problems, worth a total of **150** points, on **11** sheets of paper including the front cover. Each Problem is worth **6** points. Please cross $\boxed{\times}$ the correct answers for the multiple choice questions. Books and notes are not allowed. You may use your calculator.

Name: _____

Prof: _____

1.	a	•	c	d	e
2.	•	b	c	d	e
3.	•	b	c	d	e
4.	a	•	c	d	e
5.	a	b	c	•	e
6.	a	b	•	d	e
7.	a	•	c	d	e
8.	a	b	•	d	e
9.	•	b	c	d	e
10.	a	b	c	d	•
11.	a	b	c	•	e
12.	a	•	c	d	e
13.	a	b	c	d	•
14.	a	•	c	d	e
15.	a	b	•	d	e
16.	a	b	c	•	e
17.	•	b	c	d	e
18.	a	b	•	d	e
19.	a	b	c	•	e
20.	a	b	•	d	e
21.	a	•	c	d	e
22.	a	b	c	d	•
23.	•	b	c	d	e
24.	a	b	c	d	•
25.	a	•	c	d	e

Total _____

5a's 7b's 5c's 4d's 4e's