

**Practice DEPARTMENTAL FINAL EXAMINATION
2015**

MATH-M 119 BRIEF SURVEY OF CALCULUS
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Directions

- **DO NOT OPEN** this test booklet until you are asked to do so.
- There are six pages on this exam with 20 problems.
- **PRINT** your name and student ID# and check your section below.
- You have two hours to complete this examination.
- No scratch paper – if you need extra paper use the back of the cover sheet.
- Sharing calculators is not permitted.
- The only permissible calculator is the TI-**30XA**

**NO notes, books; Cell phones should be OFF.
Earpieces are not permitted.**

NEATNESS COUNTS. CORRECT NOTATION COUNTS.

To receive credit show supporting work.

NAME (Print Clearly)	
UNIV ID#	

Do Not Write In This Area		
Page 2	10	
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Page 5	10	
Page 6	10	
TOTAL	50	
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1. Given $y = \frac{3}{x^4} + 2x^4$ find $\frac{dy}{dx}$

_____ (2)

2. Given $f(x) = \ln(x^2 + 3x)$ Find $f'(1)$

_____ (2)

3. Differentiate: $y = e^{-x} \cdot x^5$

_____ (2)

4. Given $y = 8\sqrt{x}$. Find $\left. \frac{dy}{dx} \right|_{x=25}$ and simplify.

_____ (2)

5. If $f(x) = 3x^2(4x + 1)^5$ find $f'(x)$. Simplify your answer by multiplying constants together.

6. Write an equation of the tangent line to the curve $y = f(x) = x^3 + 1$ at $x = -2$.

_____ (2)

7. A state park charges \$100 for an annual pass. At this rate 750 people purchase passes every year. For each \$5 decrease in price 15 more people purchase a pass. What price should the park charge in order to maximize **revenue**? Use calculus and show your work.

_____ (2)

8. Consider the polynomial $y = f(x) = x^3 - 6x^2$ on the closed interval $[-1, 7]$. Find the absolute maximum and the absolute minimum points for the function on the interval $[-1, 7]$. Be sure to include both x and y coordinates for your points.

Abs max _____

Abs min _____

9. The demand function for suits is given by $p = 156 - 0.4x$ and we also know that the total cost to produce x freezers is $C(x) = 4000 + 0.25x^2$. How many suits should be sold in order to maximize profit?

10. Find each indefinite integral:

a. $\int \left(\frac{4}{x^3} + \frac{7}{x} \right) dx$

_____ (2)

b. $\int (2e^{5x} + 1) dx$

_____ (2)

c. $\int \left(\frac{1}{\sqrt{x}} - 5x^6 \right) dx$

_____ (2)

11. Find $f(x)$ such that $f'(x) = 9x^2 + 4x - 5$ and $f(0) = 3$.

12. Rock Industries finds that the marginal cost of producing the x^{th} climbing harness is $C'(x) = x^3 - x$. Find the total cost to produce 40 harnesses, assuming that fixed costs are \$6500.

13. Approximate the area under the graph of $f(x) = x^2 + 1$ over the interval $[0, 4]$. Use the left-hand sum and compute the area of 4 rectangles.

_____ (2)

14. $\int_1^2 (4t^3 - 1) dt$

_____ (3)

15. $\int_4^{25} \sqrt{x} dx$

_____ (3)

16. Larry's Lawncare estimates that its sales are growing continuously at a rate given by $S'(t) = 10e^t$ where $S'(t)$ is given in dollars per day, on day t . Find the accumulated sales for the first 5 days.

_____ (2)

Evaluate each definite integral. Then choose the best description of the area of the region involved.

- a. More area is above the x-axis than is below.
- b. More area is below the x-axis than is above.
- c. The areas above and below the x-axis are equal.

17. $\int_{-1}^1 (x^3 + 4x) dx$

18. $\int_0^2 (x^2 - x) dx$

Answer for 17: _____

Answer for 18: _____

Circle one: a b c

Circle one: a b c

19. Find the present value of \$10,000 due 8 years in the future, if interest is compounded continuously at an annual rate of 4%.

20. Find the accumulated present value of a continuous income stream of \$10,000 per year for 8 years, if interest is compounded continuously at an annual rate of 4%.

M119 Practice Final Exam ANSWERS

1. $-12x^{-5} + 8x^3$
2. $5/4$
3. $5x^4e^{-x} - x^5e^{-x}$
4. $4/5$
5. $60x^2(4x + 1)^4 + 6x(4x + 1)^5$
6. $y = 12x + 17$
7. \$175
8. absolute max at (7, 49); absolute min at (4, -32)
9. 120
- 10a. $-2x^{-2} + 7 \ln x + C$
- 10b. $\frac{2}{5}e^{5x} + x + C$
- 10c. $2\sqrt{x} - \frac{5}{7}x^7 + C$
11. $3x^3 + 2x^2 - 5x + 3$
12. \$645,700
13. 18
14. 14
15. 78
16. \$1474.13
17. 0 c
18. $2/3$ a
19. \$7261.49
20. \$68,462.74