Math127 Final 2013 Special Code:050712

HAND IN THE ENTIRE BOOKLET FOR THE FINAL

Name _____

Signature _____

Student ID Number (all 8 digits) ____ ____ ____ ____ ____ ____ ____ ____

Please shut off all cell phones, ear phones, computers, beepers, etc…

Please put everything away except a #2 pencil and a calculator that is not attached to a cell phone. You will have 2 hours to complete the thirty multiple choice questions on this exam. If you need more paper or have a question during the exam, please raise your hand and we will come to you. It is very important that you fill in your answers (the "bubbles") on the answer sheet correctly so that the grading machine reads your answers correctly. Please be conscientious in filling out the bubble sheet.

1. Please fill in the information at the top of this page.
2. On the bubble sheet where it says "Name," please print your last name, leave a space, and then print your first name in the rectangles. Then fill in the bubbles underneath.
3. On the bubble sheet, where it says "Identification Number," please **CAREFULLY** write your entire Student ID number in the rectangles and fill in the bubbles underneath. ***Please double check to make sure you bubbled in your ID # correctly.***
4. On the bubble sheet, where it says "Special Code" please write the number **050713** in the rectangles and fill in the bubbles underneath.
5. On the bubble sheet, where it says "Grade" or "Educ" bubble in your section number

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6. Lastly ***do not*** write anything in the sections labeled "Sex" or "Birth date"

Please double check that you bubbled your answers correctly on the bubble sheet. When you are finished, quietly gather your belongings and come to the front of the room. Have your student ID card ready to show us.

Grades will be posted on your MOODLE page just as soon as they are done. Please do not call or email asking for your grade. We cannot give grades out by phone or email.

GOOD LUCK!!

1. If $f(x) = 2x^2$ then $\frac{f(x+h)-f(x)}{h}$ =

   (A) $4x + h$
   (B) $2h$
   (C) $4x + 4h$
   (D) $4h + h^2$

2. If $f(x) = \ln(5x+1)$ and $g(x) = 2x-3$ then which of the following is equal to $(g(x))$?

   (A) $\ln(10x-14)$
   (B) $\ln(25x^2+10x+1)-3$
   (C) $\ln(7x-2)-3$
   (D) $\ln(25x^2+10x-2)$

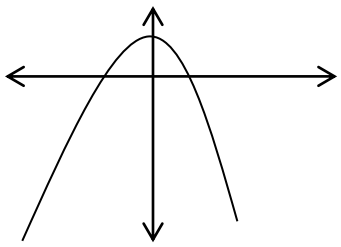
3. Based on the table below, which of the following is equivalent to $h(g(-2))$?

x	-2	-1	0	1	2
$g(x)$	0	1	-2	3	-1
$h(x)$	3	0	2	-2	-1

   (A) 0
   (B) 3
   (C) 1
   (D) 2

4. Which of the following is true for the function $f(x)$ graphed to the right?

   (A) $f'(x) > 0$ for $x < 0$ and $f'(x) < 0$ for $x > 0$
   (B) $f'(x) < 0$ for $x < 0$ and $f'(x) < 0$ for $x > 0$
   (C) $f'(x) < 0$ for $x < 0$ and $f'(x) > 0$ for $x > 0$
   (D) $f'(x) > 0$ for $x < 0$ and $f'(x) > 0$ for $x > 0$



5. The cost, C (in dollars) to produce q wicker baskets can be expressed as $C = f(q)$. Which of the following best describes the statement: $f'(100) = 2.3$.

   (A) It costs \$230 to produce 100 wicker baskets.
   (B) When 2.3 wicker baskets are produced, it is costing the company \$100 per basket to produce them.
   (C) When the 100^{th} wicker basket is produced, it is costing the company \$2.30 per basket to produce them.
   (D) It costs \$100 to produce 2.3 wicker baskets.

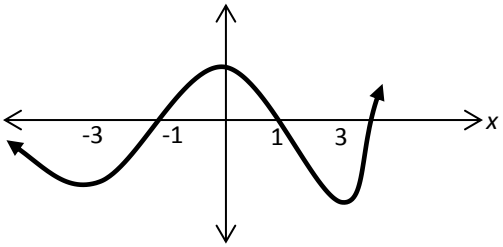
6. Given the function: $y = -2\,sin(4\theta) + 1$, which of the following is true?

   (A) The amplitude is 2 units and the period is π units.
   (B) The amplitude is -2 units and the period is 2 units.
   (C) The amplitude is -2 units and the period is 1 unit.
   (D) The amplitude is 2 units and the period is $\pi/2$ units

7. Find the value of the following limit numerically: $\lim_{x \to 5} \frac{x^2 - 25}{x - 5}$.

   (A) 14
   (B) 7
   (C) 15
   (D) 10

8. Given the graph of $f(x)$ to the right, which of the following is a true statement about $f'(x)$?



   (A) $f'(x)$ is negative on $(-1,1)$.
   (B) $f'(x)$ is negative on $(0,3)$
   (C) $f'(x)$ is positive on $(-\infty,-2)$ and $(1,3)$.
   (D) $f'(x)$ is positive on $(0,\infty)$.

9. Suppose $f(8) = 10$ and $f'(8) = -2$ use local linear approximation to estimate $f(10)$.

   (A) $f(10) \approx 12$
   (B) $f(10) \approx 8$
   (C) $f(10) \approx 14$
   (D) $f(10) \approx 6$

10. For three minutes the temperature of a feverish person has had a positive first derivative and negative second derivative. Which of the following is correct?

   (A) The temperature rose in the last minute more than it rose in the minute before.
   (B) The temperature rose in the last minute, but less than it rose in the minute before.
   (C) The temperature fell in the last minute more than it fell in the minute before.
   (D) The temperature fell in the last minute, but less than it fell in the minute before.

11. Find the equation of the tangent line of the graph of $f(x) = x^3 - 4x - 4$ at $x = 2$.

(A) $y = -4x$
(B) $y = 8x - 4$
(C) $y = 8x - 20$
(D) $y = 4x - 8$

12. Given the following table of $f'(x)$, which statement is most accurate:

x	0	2	4	6	8	10	12	14
f ' (x)	8	6	-1	3	-5	-2	-1	-2

(A) $f(x)$ has a local maximum between x = 6 and x = 8 and a local minimum between x = 4 and x = 6.
(B) $f(x)$ has a local maximum at x=0 and a local minimum at x=8
(C) $f(x)$ has a local maximum between x = 4 and x = 6 and a local minimum between x = 6 and x = 8
(D) $f(x)$ has a local maximum value of 8 and does not have a local minimum.

13. Which of the following is the second derivative of $y = \cos(x^2)$?

(A) $y'' = -4x^2 \sin(x^2) + 2\cos(x^2)$
(B) $y'' = -4x^2 \cos(x^2) + 2\sin(x^2)$
(C) $y'' = -4x^2 \sin(x) + 2\cos(x)$
(D) $y'' = 2x\sin(x^2)$

14. Let $f(x) = \sin(x)$ and $g(x) = e^x$. If $h(x) = g(f(x))$ calculate $h'(x)$.

(A) $\cos(x)e^{\sin(x)}$
(B) $e^{\sin(x)}$
(C) $e^x\cos(e^x)$
(D) $\sin(e^x)$

15. Find the inflection point(s) of the function $f(x) = -2xe^{4x}$:

(A) $f(x)$ has an inflection point at x= -1
(B) $f(x)$ has an inflection point at x= -.5
(C) $f(x)$ has an inflection point at x= -.25
(D) $f(x)$ has no inflection points

16. Find the global minimum and global maximum values of the function on the interval. $f(x) = x^3 - 3x^2 - 8x + 1$ on $0 \leq x \leq 6$.

(A) Global maximum: $f(0) = 1$; Global minimum: $f(6) = 61$.
(B) Global maximum: $f(6) = 61$; Global minimum: $f(-2) = -3$.
(C) Global maximum: $f(4) = -15$; Global minimum: $f(0) = 1$.
(D) Global maximum: $f(6) = 61$; Global minimum: $f(4) = -15$.

17. Suppose the revenue for a company is given by $R(q) = 750q$ and cost is given by $C(q) = 8500 + 5q^2$. Remembering that profit is revenue minus cost, find the quantity that maximumizes profit.

(A) 170
(B) 15,350
(C) 850
(D) 75

18. The spread of a virus through a community can be modeled with the logistic equation $P(t)$, where t is time in weeks and $P(t)$ represents the number of people infected with the virus. Suppose that 30 people originally have the virus, and the number of people infected is increasing approximately exponentially, with a continuous growth rate of 1.04. It is estimated that, in the long run, approximately 1200 people will be infected. What is the logistic equation that could model this data?

(A) $P(t) = \frac{1200}{1+39e^{-1.04t}}$

(B) $P(t) = \frac{30}{1+1200e^{-1.04t}}$

(C) $P(t) = \frac{1200}{1+30e^{-1.04t}}$

(D) $P(t) = \frac{1200}{1+1.04e^{-12t}}$

19. Suppose the amount of a drug in the bloodstream is given by $C(t) = 5te^{-.1t}$, where t is in minutes since the drug was administered and concentration is in mg. If the patient is able to withstand certain testing when the drug reaches its maximum concentration what will the concentration in the bloodstream be when they can perform this test?

(A) The tests should be performed when the concentration is 10 mg.
(B) The tests should be performed when the concentration is 1.839 mg.
(C) The tests should be performed when the concentration is 18.39 mg.
(D) The tests should be performed when the concentration is 1 mg

20. Which of the following is represents an estimate of $\int_0^4 \sin(x)dx$ using right-hand endpoints and four subintervals (i.e. $n = 4$).

(A) $\int_0^4 \sin(x)dx \approx (0.5)(\sin(.5)) + (0.5)(\sin(1)) + (0.5)(\sin(1.5)) + (0.5)(\sin(2))$
(B) $\int_0^4 \sin(x)dx \approx (1)(\sin(1)) + (2)(\sin(1)) + (3)(\sin(1)) + (4)(\sin(1))$
(C) $\int_0^4 \sin(x)dx \approx (1)(\sin(1)) + (1)(\sin(2)) + (1)(\sin(3)) + (1)(\sin(4))$
(D) $\int_0^4 \sin(x)dx \approx \cos(4)$

21. Which of the following represents the area between the graphs of $y = x^2$ and $y = 5x$?

(A) $\int_0^5 (x^2 - 5x)dx$
(B) $\int_0^5 (5x - x^2)dx$
(C) $\int_0^{10} (x^2 - 5x)dx$
(D) $\int_0^{10} (5x - x^2)dx$

22. Find the anti-derivative of $f(x) = \sin(3x) + 100$

(A) $3\cos(3x) + C$
(B) $-3cos(3x) + 100x + C$
(C) $\frac{\cos(3x)}{3} + 100 + C$
(D) $\frac{-\cos(3x)}{3} + 100x + C$

23. $\int x^3 + e^{5x} + \frac{1}{x} dx$

(A) $\frac{x^4}{4} + \frac{e^{5x}}{5} + ln|x| + C$
(B) $3x^2 + 5e^{5x} - \frac{1}{x^2}$
(C) $\frac{x^4}{4} + \frac{e^{5x}}{5} - \frac{1}{x^2} C$
(D) $\frac{x^4}{4} + 5e^{5x} + ln|x| + C$

24. If you choose $u = 5x^2 + 6$ in order to find the integral $\int 10x(5x^2 + 6)^{10} dx$ by the method of substitution, what would *du* be?

(A) 10
(B) 10x
(C) 10x dx
(D) 10 du

25. The integral $\int x^2 \sin(5x)\, dx$ can be found using an integration by parts. If you begin the substitution with $u = x^2$, what would *v* turn out to be?

(A) dx
(B) 5cos(5x)dx
(C) $\frac{-\cos(5x)}{5}$
(D) 2x

26. $\int x^3(x^4 - 5)^4 dx$

(A) $(x^4 - 5)^5 + C$

(B) $\frac{(x^4-5)^5}{4} + C$

(C) $\frac{(x^4-5)^5}{20} + C$

(D) $\frac{(x^4-5)^3}{12} + C$

27. $\int x^3\sqrt{(x^4+2)}\,dx$

(A) $\frac{8}{3}(x^4+2)^{\frac{3}{2}}+C$
(B) $\frac{1}{6}(x^4+2)^{\frac{3}{2}}+C$
(C) $\frac{2}{3}(x^4+2)^{\frac{3}{2}}+C$
(D) $-\frac{1}{2}(x^4+2)^{-\frac{1}{2}}+C$

28. $\int 25x\sin(x)\,dx$

(A) $25\sin x-25x\cos x+C$
(B) $25\sin x+25x\cos x\ +C$
(C) $25\sin x-25\cos x+C$
(D) $25\sin x-x\cos x+C$

29. $\int -4\,x\cos(9x)\,dx$

(A) $-\frac{4}{81}\cos(9x)-\frac{4}{9}x\sin(4x)+C$
(B) $-\frac{4}{9}\cos(9x)-4x\sin(9x)+C$
(C) $-\frac{4}{81}\cos(9x)-\frac{4}{9}x\sin(9x)+C$
(D) $-\frac{4}{81}\cos(9x)-\frac{4}{9}\sin(9x)+C$

30. $\int \ln(10x)\,dx$ (hint: you will have to use integration by parts)

(A) $xln(10x)+C$
(B) $xln(10x)-5x^2+C$
(C) $10xln(10x)-5x^2+C$
(D) $xln(10x)-x+C$