Math127 **MAKEUP** **Special Code: 112918**

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 90 minutes to complete the twenty five questions on this exam. 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.

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 **112918** 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

Section 1 Calden Tues/Thurs 8:30AM
Section 2 Calden Tues/Thurs 10:00 AM
Section 3 Burrell Tues/Thur 11:30 AM
Section 4 Burrell Tues/Thur 1:00 PM
Section 5 Nikolaou MWF 12:20 PM
Section 6 Nikolaou MWF 1:25 PM

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 and ***circle your answers on your test booklet before you hand it in.*** *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!!

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

$$\ln(AB) = lnA + lnB$$

$$ln\left(\frac{A}{B}\right) = lnA - lnB$$

$$ln(A^p) = plnA$$

$$y = mx + b$$

$$\frac{d}{dx}(a^x) = a^x lna$$

$$\frac{d}{dx}(a^u) = a^x lna \frac{du}{dx}$$

$$\frac{d}{dx}(e^x) = e^x$$

$$\frac{d}{dx}(lnx) = \frac{1}{x}$$

$$y - y_1 = m(x - x_1)$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$f(x) \approx f(a) + f'(a)\Delta x$$

$$\frac{f'(a)}{f(a)}$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$\frac{d}{dx}(cf(x)) = cf'(x)$$

$$\frac{d}{dx}(f(x) + g(x)) = f'(x) + g'(x)$$

$$\frac{d}{dx}(f(x) - g(x)) = f'(x) - g'(x)$$

$$\frac{d}{dx}(f(x)g(x)) = f(x)g'(x) + g(x)f'(x)$$

$$\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$$

$$\frac{d}{dx}(sinu) = cosu \cdot \frac{du}{dx}$$

$$\frac{d}{dx}(cosu) = -sinu \cdot \frac{du}{dx}$$

$$\frac{f(b) - f(a)}{b - a}$$

$$P = \frac{2\pi}{B}$$

$$sin^2x + cos^2x = 1$$

$$P(t) = \frac{L}{1 + Ce^{-kt}}$$

$$y = ate^{-bt}$$

$$\int_a^b f(t)dt = \lim_{n \to \infty} \left(\sum_{t=0}^{n-1} f(t_i)\Delta t \right)$$

$$\int_a^b F'(x)dx = F(b) - F(a)$$

$$\int x^k dx = \frac{x^{\{k+1\}}}{k+1} + C, \text{ if k not -1}$$

$$\int \frac{1}{x} dx = \ln(|x|) + C$$

$$\int e^{kx} dx = \frac{e^{\{kx\}}}{k} + C$$

$$\int \cos(x)\, dx = \sin(x) + C$$

$$\int \sin(x) dx = -\cos(x) + C$$

$$\int udv = uv - \int vdu$$

$$A = \frac{Max - Min}{2}$$

1. Find the equation of the tangent line to $f(x) = ax^2$ at $x = a$

(A) $y = 2a^2x$
(B) $y = 2ax + a$
(C) $y = 2a^3 - a$
(D) $y = 2a^2x - a^3$

2. Find the derivative of the function $f(x) = \frac{1}{\sqrt[5]{x}}$.

(A) $-\ 5x^{-\frac{6}{5}}$
(B) $-\ 5x^{\frac{6}{5}}$
(C) $5x^4$
(D) $5x^{-4}$

3. Find the equation of the tangent line to $y = 2^x$ at $x = 3$.

(A) $y = 8\ln(2)\,x + (8 - 24\ln(2))$
(B) $y = 8x - 21$
(C) $y = 8\ln(2)\,x + (24\ln(2) - 8)$
(D) $y = 2\ln(2)\,x + (8 - 6\ln(2))$

4. Find the slope of the line tangent to the graph of $y = \frac{3x+1}{5x+1}$ at x=0.

(A) -4
(B) -2
(C) -7
(D) -3

5. Let $f(x) = \ln\big(g(x)\big) + e^{g(x)}$. Then $f\,'(x)$ = _____.

(A) $g'(x)\left(\frac{1}{g(x)} + e^{g(x)}\right)$

(B) $\frac{g\prime(x)}{g(x)+e^{g(x)}}$

(C) $g'(x)(\ln(g(x) + e^{g(x)})$

(D) $g'(x)e^{g(x)}(\ln(g(x) + 1)$

6. Find the derivative of the function $f(x) = (x^3 + 9^x) * e^{2x}$.

(A) $e^{2x}(2x^3 - 3x + 18^x + 9^x \cdot \ln(9))$
(B) $e^{2x}(2x^3 + 3x + 2 \cdot 9^x + 9^x \cdot \ln(9))$
(C) $e^{2x}(2x^3 + 3x^2 + 2 * 9^x + 9^x * \ln(9))$
(D) $e^{2x}(2x^3 - 3x^2 + 18^x + 9^x \cdot \ln(9))$

7. Given the function $f(x) = \sin^3 x$, at $x = -\frac{3\pi}{4}$ the graph of f is:

(A) Increasing and concave up
(B) Decreasing and concave up
(C) Increasing and concave down
(D) Decreasing and concave down

8. Find all the critical points for the function $y = 3x + \frac{9}{x}$

(A) $x = -3$ and $x = 3$
(B) $x = -\sqrt{3}$ and $x = \sqrt{3}$
(C) $x = 3$ and $x = -3$
(D) $x = 9$ and $x = -9$

9. Find the local maxima and minima of $f(x) = x^4 - 2x^2 + 3$.

(A) Local maximum at $x = 0$, local minimum at $x = 1$.
(B) Local maximum at $x = 1$, local minimum at $x = 0$.
(C) Local maximum at $x = 1$, local maximum at $x = -1$, local minimum at $x = 0$.
(D) Local maximum at $x = 0$, local minimum at $x = 1$, local minimum at $x = -1$

10. Find the parameters a and b of the function $f(x) = x^4 + 3ax^2 + b$, if f has an inflection point at (1,-13).

(A) $a = -4, b = 8$
(B) $a = \frac{3}{4}, b = -18$
(C) $a = \frac{4}{3}, b = -18$
(D) $a = -2, b = -8$

11. The height of a ball tossed upward with an initial velocity of 48 ft/sec from a height of 6 feet is modeled by the function $s(t) = -16t^2 + 48t + 6$. What is the maximum height attained by the ball?

(A) 48 ft
(B) 16 ft
(C) 32ft
(D) 42 ft

12. Find the global maxima and minima of the function $f(x) = x^3 - 3x^2 + 6$ on the interval $-1 \leq x \leq 3$.

(A) The global maximum is 6 and the global minimum is 2.
(B) The global maximum is 2 and the global minimum is -6.
(C) The global maximum is 6 and there is no global minimum.
(D) The global maximum is 0 and global minimum is 2.

13. An electric bicycle company rents 250 bicycles. When q bicycles are rented the monthly profit, in dollars is $P(q) = -8q^2 + 3200q - 80000$. How many bicycles should the company rent in order to maximize profit?

(A) 250 bicycles
(B) 180 bicycles
(C) 230 bicycles
(D) 200 bicycles

14. Given the logistic growth curve model below, for which value of k, does the logistic growth curve have an inflection point at $t = 15.3$?

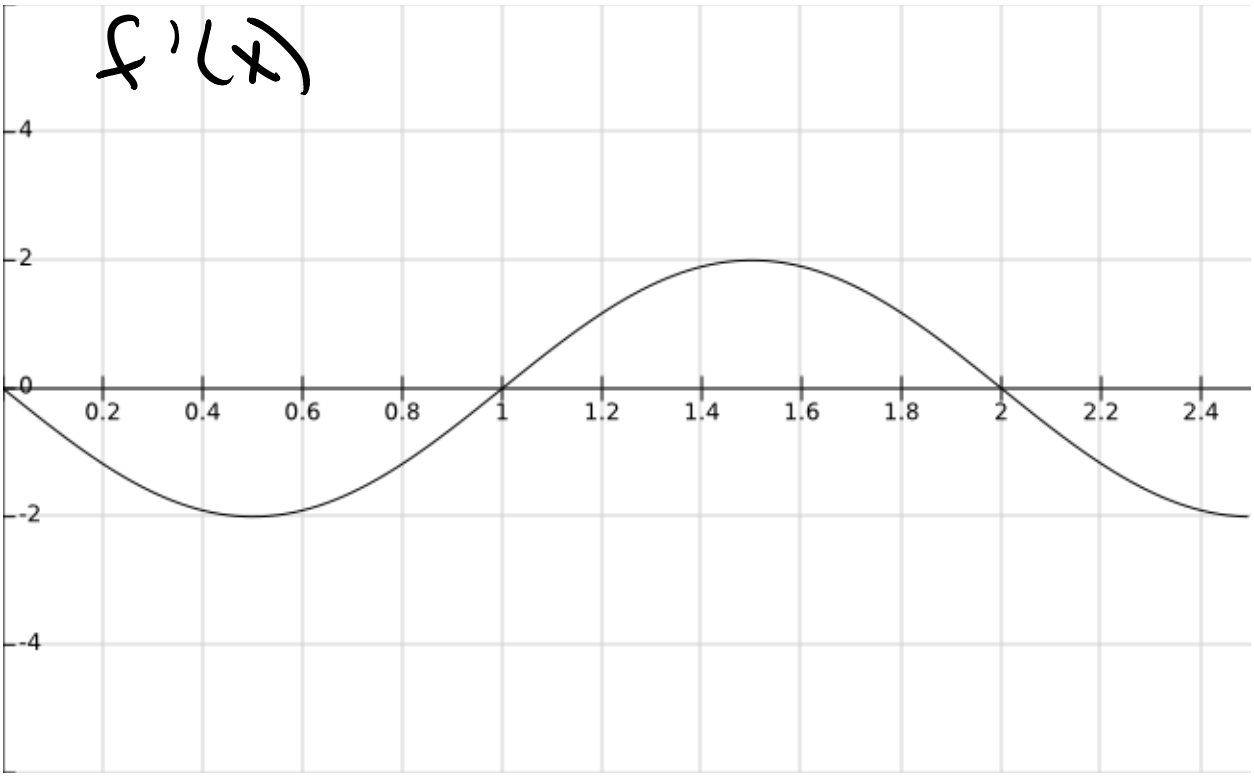
$$P = \frac{100}{1 + 99e^{-kt}}$$

(A) $k = 0.1$
(B) $k = 0.2$
(C) $k = 0.3$
(D) $k = 0.4$

15. If time, t, is in hours and concentration, C, is in ng/ml, the drug concentration curve of a drug is given by $C = 17.5te^{-0.2t}$. When does the drug concentration curve have an inflection point?

(A) At 10 hours
(B) At 3 hours
(C) At 5 hours
(D) At 8 hours

16. Given the graph of the derivative, $f'(x)$, below which of the following statements about $f(x)$ is TRUE?

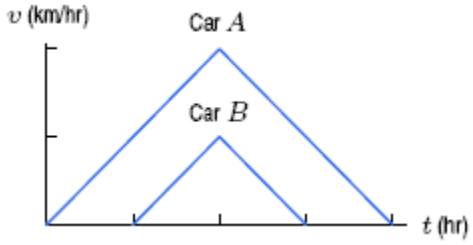


(A) $f(x)$ has local maximum at $x = 0.7$ and a local minimum at $x = 1.5$.
(B) $f(x)$ has local minimum at $x = 0.7$ and a local maximum at $x = 1.5$.
(C) $f(x)$ has local maximum at $x = 1$ and a local minimum at $x = 2$.
(D) $f(x)$ has local minimum at $x = 1$ and a local maximum at $x = 2$.

17. A car is initially travelling at 80 ft/sec, and with constant deceleration comes to a stop in 10 seconds. How far does the car travel over that 10 second period?

(A) 100 feet
(B) 200 feet
(C) 400 feet
(D) 500 feet

18. Two cars travel in the same direction along a straight road. The figure below shows the velocity, v, of each car at time t. Car B starts 2 hours after car A and car B reaches a maximum velocity of 35 mph. How many more kilometers did car A travel than car B.



(A) 70 km
(B) 210 km
(C) 80 km
(D) 250 km

19. Use the table to find the best estimate of $\int_0^{18} f(x)dx$.

$\underline{x}$	0	3	6	9	12	15	18
$f(x)$	12	10	6	4	8	20	40

(A) 180
(B) 222
(C) 264
(D) 240

20. Estimate the value of $\int_0^{10}(x^2 + 2x)dx$ using a right hand sum with $\Delta x=2$.

(A) 433
(B) 440
(C) 320
(D) 560

21. Find the area enclosed by the functions $y = x^2$ and $y = 6x$.

(A) 6
(B) 30
(C) 36
(D) 42

22. The velocity of a car, in miles per hour, is given as $v(t) = 40t - 6t^2$. Use this function to determine the total distance traveled from $t = 0$ to $= 3$.

(A) 66 miles
(B) 126 miles
(C) 216 miles
(D) 34 miles

23. Paul calculated that his income for the current year is $\$80{,}000$. If his annual income is will increase at a rate of $S(t) = 500(1.4)^t$ dollars per year from now on, estimate Paul's income after 10 years.

(A) $\$\ 154{,}363$

(B) $\$\ 194{,}463$

(C) $\$\ 95{,}463$

(D) $\$\ 121{,}497$

24. The marginal revenue function to produce q units of a certain item is given by the equation $R'(q) = 400 - 25q^{\frac{1}{6}}$. Estimate the total revenue, to the nearest dollar, if 80 units are sold.

(A) $11,911

(B) $30,007

(C) $28,442

(D) $31,917

25. The population growth of Tokyo grew at a linear rate from 0.33 million/year in 1970 to 0.45 million/year in 1990. Estimate the total change in population between 1970 and 1990.

(A) 7,800,000
(B) 780,000
(C) 78,000,000
(D) 780,000,000

SCRATCH WORK