

~~2016~~ SKIP 7,10,27,42

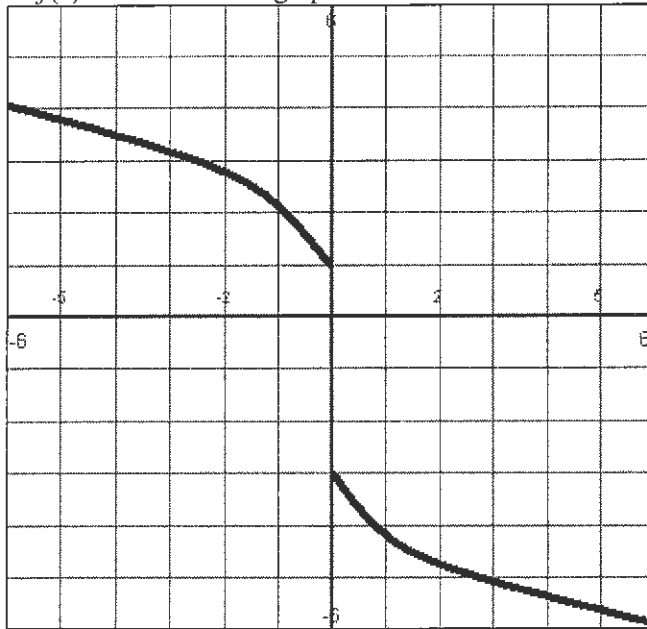
Calculus Final Exam  
Semester 1

On-line  
Practice  
Final

1.  $f(x) = 7^x$ . Find  $\frac{df(x)}{dx}$ .

- A)  $(\ln 7)(7^x)$  B)  $\frac{7}{(\ln 7)}$  C)  $\frac{1}{(\ln 7)7^x}$  D)  $\frac{7}{(\ln 7)7^x}$  E)  $49x \ln 7$

2. The function  $f(x)$  is shown in the graph:



Find  $\lim_{x \rightarrow 0^+} =$

- A) 2 B) 0 C) 3 D) -3 E) -2

3. If  $y = \sqrt[6]{\frac{x+3}{x+9}}$ , find  $\frac{dy}{dx}$  by logarithmic differentiation.

- A)  $\left(\frac{6}{x+3} + \frac{6}{x+9}\right)\sqrt[6]{\frac{x+3}{x+9}}$  D)  $\frac{1}{6}\left(\frac{1}{x+3} + \frac{1}{x+9}\right)$   
B)  $\frac{1}{6}\left(\frac{1}{x+3} + \frac{1}{x+9}\right)\sqrt[6]{\frac{x+3}{x+9}}$  E)  $\left(\frac{1}{6x+3} + \frac{1}{6x+9}\right)\sqrt[6]{\frac{x+3}{x+9}}$   
C)  $\frac{1}{6}\left(\frac{1}{x+3} - \frac{1}{x+9}\right)\sqrt[6]{\frac{x+3}{x+9}}$

4. Use the equation  $y = x^2 - 4x - 21$ . For what values of  $x$  is  $y \geq 0$ ?

- A)  $\{x: -3 \leq x \leq 7\}$  D)  $\{x: 3 \leq x \leq 7\}$   
B)  $\{x: x \leq -7 \text{ or } x \geq 3\}$  E)  $\{x: x \leq -3 \text{ or } x \geq 7\}$   
C)  $\{x: -7 \leq x \leq 3\}$

5. If  $y = \ln(\sin x)$  find  $\frac{dy}{dx}$ .

- A)  $-\frac{1}{\cos x}$  B)  $\frac{1}{\cos x}$  C)  $\cot x$  D)  $\cos x$  E)  $-\cot x$

6.  $f(x) = (x^5 - 3)^{27}$ .  $f'(x) =$

- A)  $135(x^5 - 3)^{26}$  B)  $27x^4(x^5 - 3)^{26}$  C)  $135x^4(x^5 - 3)^{26}$  D)  $5x^4(x^5 - 3)^{26}$  E)  $27(x^5 - 3)^{26}$

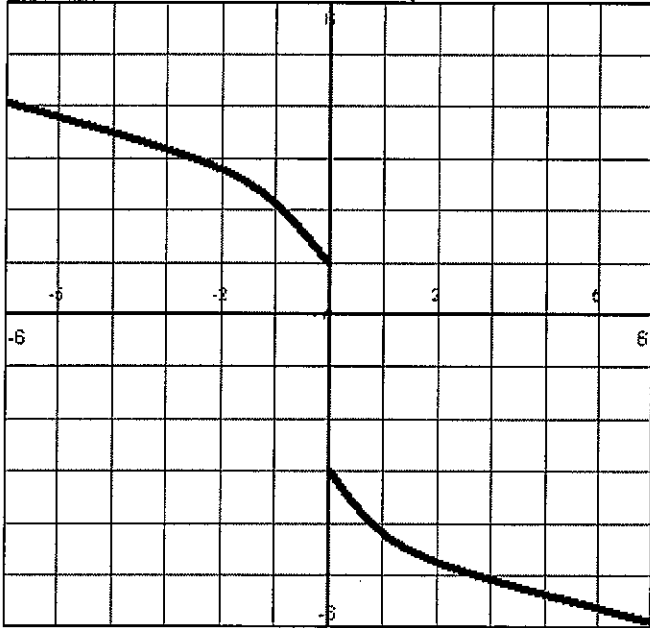
7. Find the value for which  $f(x) = x^3 - 8$  on  $[2, 5]$  satisfies the Mean-Value Theorem.

- A) 6.245 B) 2.517 C) 3.215 D) 4.416 E) 3.606

8.  $y = \cot(\cos x)$ . Find  $dy/dx$ .

- A)  $-\cos x \csc^2(\sin x)$  D)  $\cos x \csc^2(\cos x)$   
 B)  $-\sin x \csc^2(\cos x)$  E)  $\cos x \csc^2(\sin x)$   
 C)  $\sin x \csc^2(\cos x)$

9. On the interval of  $[-6, 6]$ , where is  $f$  not continuous?



- A) 3 B) -3 and 1 C) 0 and 2 D) 0 E) Nowhere

10. Find the value  $c$  such that the conclusion of Rolle's Theorem are satisfied for  $f(x) = 4x^2 - 4$  on  $[-2, 2]$ .

- A) -0.5 B) -1 C) 1 D) 0 E) 0.5

11. If  $y = x^6 \cos x$ , find  $d^2y/dx^2$ .

- A)  $6x^5 \cos x - x^6 \sin x$  D)  $30x^4 \cos x - 12x^5 \sin x$   
 B)  $30x^4 \cos x - 6x^5 \sin x - x^6 \cos x$  E)  $30x^4 \cos x - 12x^5 \sin x - x^6 \cos x$   
 C)  $30x^4 \cos x - 12x^5 \sin x + x^6 \cos x$

12.  $\lim_{x \rightarrow 2} 3 =$   
 A) 2 B) 0 C) -2 D) 6 E) 3

13.  $\lim_{x \rightarrow 9^+} \frac{x}{x-9} =$   
 A)  $\infty$  B) It does not exist. C)  $-\infty$  D) 0 E) 9

14. Find  $\frac{dy}{dx}$  if  $y \sin x = 15$ .

- A)  $\frac{dy}{dx} = y \tan x$  D)  $\frac{dy}{dx} = -y \tan x$   
 B)  $\frac{dy}{dx} = y \cot x$  E)  $\frac{dy}{dx} = -y \cot x$   
 C)  $\frac{dy}{dx} = -y \csc x$

15. Find  $dy/dx$  if  $y = \sqrt{8\pi}$ .

- A) 1 B)  $\frac{\sqrt{8\pi}}{8\pi}$  C)  $\frac{8\sqrt{\pi}}{\pi}$  D)  $-\frac{\sqrt{8\pi}}{16\pi}$  E) 0

16. Find  $f'(t)$  if  $f(t) = 6t^5 - 5$ .

- A)  $30t^5$  B)  $30t^5 - 5$  C)  $6t^4 - 5$  D)  $30t^4$  E)  $30t^4 - 5$

17. If  $y = \frac{1}{\sqrt{x-5}}$ , find  $y'(4)$ .

- A)  $\frac{1}{5}$  B)  $-\frac{1}{5}$  C)  $-\frac{1}{4}$  D)  $\frac{1}{36}$  E)  $-\frac{1}{36}$

18. Let

$$f(x) = \begin{cases} x^4, & x \leq 3 \\ x-5, & x > 3 \end{cases}, \text{ find } \lim_{x \rightarrow 3^+} f(x) =$$

- A) -2 B) 81 C) 0 D) -3 E) -1

19. Find the  $x$ -coordinates for all points of discontinuity for  $f(x) = \frac{x-5}{x^2-9x+20}$ .

- A) -4 and -5 B) 5 and 4 C) 5 D) -4 E) 4

20.  $f(x) = \cos(6x)$ .  $f'(x) =$

- A)  $-6 \cos(6x)$  B)  $-6 \sin(x)$  C)  $-\sin(6x)$  D)  $-6 \sin(6x)$  E)  $-\cos(6x)$

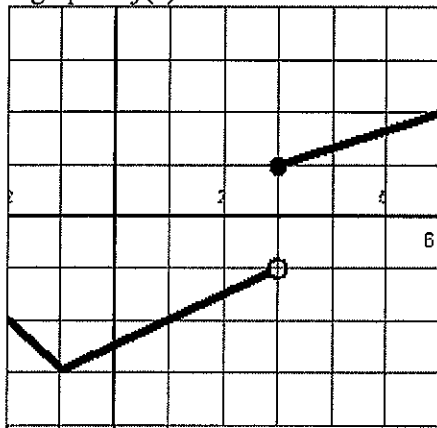
21. If  $y = \frac{6x}{x-8}$ , find  $\frac{dy}{dx}\Big|_1$ .

A)  $\frac{6}{49}$  B)  $-\frac{48}{49}$  C)  $\frac{48}{49}$  D)  $-\frac{6}{49}$  E)  $-\frac{48}{27}$

22.  $g(x) = x^2f(x)$ . Find  $g'(5)$ , given that  $f(5) = 3$  and  $f'(5) = 4$ .

A) 250 B) 110 C) 40 D) 130 E) 55

23. Use this graph of  $f(x)$



to find  $\lim_{x \rightarrow 3} f(x) =$

- A) -1 B) 1 C) 0 D) 3 E) It does not exist.

24. Find the equation of the line tangent to the graph of  $y = \cos x$  at the point where  $x = 0$ .

A)  $y = \sin x$  B)  $y = 1$  C)  $y = x$  D)  $x = 1$  E)  $y = -x$

25. If  $y = \ln 5x$  find  $\frac{dy}{dx}$ .

- A)  $\frac{x}{5}$  B)  $\frac{1}{5x}$  C)  $\frac{1}{x}$  D)  $\frac{5}{x}$  E)  $\frac{5 \ln 5x}{x}$

26.  $\lim_{x \rightarrow +\infty} \frac{6x-9}{x^2-4}$

- A) 6 B)  $\infty$  C) 0 D) It does not exist. E) 1

27. The open interval over which  $f$  is concave up for  $f(x) = 2x^3 + 5x^2 - 4x + 7$  is

- A)  $\left(-\frac{5}{6}, \infty\right)$  B)  $\left(-\infty, -\frac{5}{6}\right)$  C)  $(-\infty, \infty)$  D)  $\left(-\frac{5}{6}, \frac{5}{6}\right)$  E)  $\left(\frac{5}{6}, \infty\right)$

28.  $\lim_{x \rightarrow -\infty} \frac{-16x^3+3}{2x^3-1} =$

- A)  $+\infty$  B) 8 C) 0 D)  $-\infty$  E) -8

29. Given  $y = 7\sqrt{x}$ , find  $\frac{dy}{dx}$ .
- A)  $\frac{7\sqrt{x}}{2}$  B)  $\frac{7\sqrt{x}}{x}$  C)  $\frac{\sqrt{x}}{2x}$  D)  $\frac{7}{2x}$  E)  $\frac{7\sqrt{x}}{2x}$
30. If  $x^2 + y^2 = 49$ , find  $dy/dx$ .
- A)  $\frac{dy}{dx} = \frac{y}{x}$  B)  $\frac{dy}{dx} = \frac{x}{y}$  C)  $\frac{dy}{dx} = 2x + 2y$  D)  $\frac{dy}{dx} = -\frac{x}{y}$  E)  $\frac{dy}{dx} = -\frac{y}{x}$
31. Let  $s(t) = t^3 - t$  be a position function of a particle. At 3 the particle's acceleration is
- A) positive B) zero C) negative
32.  $\lim_{x \rightarrow -\infty} \frac{28x^6 - 1}{7x^6 + 9} =$
- A) 0 B)  $-\infty$  C)  $\infty$  D) 4 E) It does not exist.
33.  $\lim_{x \rightarrow +\infty} (7x^6 - 5x^4 - x^3 + 7x)$
- A) It does not exist. B) 7 C)  $\infty$  D) 0 E)  $-\infty$
34. Find the equation of the tangent line to  $y = f(x) = 5x$  at  $x = 4$ .
- A)  $y = 5x + 4$  B)  $y = 5x - 20$  C)  $y = -5x$  D)  $y = 5x - 4$  E)  $y = 5x$
35. Find  $f'(x)$  if  $f(x) = x^4 \cos x$ .
- A)  $-4x^3 \cos x$  B)  $-4x^3 \sin x$  C)  $4x^3 \cos x - x^4 \sin x$  D)  $4x^3 \cos x$  E)  $4x^3 \sin x$
36.  $f(x) = \begin{cases} 3x + 8, & x \leq 6 \\ kx + 14, & x > 6 \end{cases}$ . Find the value for the constant  $k$  that will make the function continuous everywhere.
- A) 2 B) 4 C) 6 D) 5 E) 3
37. Find the equation of the tangent line to  $y = f(x) = \sqrt[3]{x} + 8$  at  $x = 8$ .
- A)  $y = \frac{x}{3} + \frac{112}{3}$  B)  $y = \frac{x}{12} + \frac{28}{3}$  C)  $y = \frac{x}{12} + \frac{112}{4}$  D)  $y = \frac{x}{3} + \frac{112}{12}$  E)  $y = \frac{x}{12} + \frac{8}{3}$

38. If  $y = (\ln 7x)e^{5x}$ , find  $\frac{dy}{dx}$ .

A)  $5(\ln 7x)e^{5x} + \frac{7e^{5x}}{x}$

D)  $5(\ln 7x)e^{5x}$

B)  $5(\ln 7x)e^{5x} + \frac{e^{5x}}{x}$

E)  $(\ln 7x)e^{5x} + \frac{e^{5x}}{x}$

C)  $\frac{5(\ln 7x)e^{5x}}{x}$

39. Find an equation for the tangent line to the graph of  $y = x \cos x$  at  $x = \pi$ .

A)  $y = \pi x - \pi^2$  B)  $y = -x + \pi$  C)  $y = -x + 2\pi$  D)  $y = x - \pi$  E)  $y = x + \pi$

40.  $\lim_{x \rightarrow -8} \frac{16}{x+8} =$

A)  $+\infty$  B) 16 C) 0 D)  $-\infty$  E) It does not exist.

41.  $\lim_{x \rightarrow -9} \frac{x^2 - 81}{x + 9} =$

A) -18 B) -81 C) 9 D) 81 E) -9

42. Determine the  $x$ -coordinate of each critical point of  $f(x) = \sqrt[3]{x-8}$ .

A) None exist B) 9 C) 0 D) 8 E) -8

43.  $y = 8x^2 + 7x + 7$ . Find  $d^2y/dx^2$ .

A) 8 B) 16 C)  $16x + 7$  D)  $8x + 7$  E) 7

44.  $s(t) = 4t - 8t^2$ ,  $t \geq 0$ . The velocity function is

A)  $4 - 16t$  B)  $4t - 16t^2$  C)  $8 - 16t$  D)  $4 - 8t$  E)  $4t - 8t$

45.  $f(x) = \sqrt{x^7 + 8}$ .  $f'(x) =$

A)  $\frac{7x^6 + 8}{2\sqrt{x^7 + 8}}$  B)  $\frac{7x^7}{2}$  C)  $\frac{7x^6}{2\sqrt{x^7 + 8}}$  D)  $\frac{7x^6}{\sqrt{x^7 + 8}}$  E)  $\frac{7x^6}{2}$