

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} x \csc(3x)$. a) 0 b) DNE c) $\frac{1}{3}$ d) 3 e) ∞ f) $-\infty$ g) 1

2. The displacement of a particle moving in a straight line is given by $s = t^2 + t$. Find the average velocity from $t = 1$ to $t = 3$.

a) 5 b) 6 c) 7 d) 8 e) 9 f) 10

3. Find the second derivative of $y = \sin(2x)$. a) $2 \cos(2x)$ b) $-\sin(2x)$

c) $-2 \sin(2x)$ d) $-4 \sin(2x)$ e) $4 \sin(2x)$ f) $4 \cos(2x)$

4. Evaluate $\lim_{x \rightarrow -4^-} \frac{x}{x+4}$. a) $-\frac{4}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$

5. Evaluate $\lim_{x \rightarrow 1} \frac{x^3 - x}{x - 1}$. a) DNE b) $\frac{0}{0}$ c) 1 d) 2 e) 3 f) 4

6. Find the derivative of $f(x) = 12x^{1/3}$ at $x = 8$.

a) 0 b) 1 c) 2 d) 3 e) 4

7. Find the slope of the line that is normal to $y = \frac{4}{5}(x^2 + 6x)^{1/2}$ at $x = 2$.

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

8. Evaluate $\lim_{x \rightarrow \infty} \frac{1 + x - 2x^3}{4x^3 + x^2 + 1}$.

a) $\frac{1}{4}$ b) DNE c) $\frac{1}{2}$ d) $-\frac{1}{2}$ e) 0

9. Find the derivative of $y = \csc(x^2)$.

a) $-\csc(x^2) \cot(x^2)$ b) $-2x \csc(x^2) \cot(x^2)$ c) $2x \csc(x^2) \cot(x^2)$

d) $2x \csc^3(x^2)$ e) $-2x \csc^3(x^2)$

10. Find the derivative of $y = \csc^2(x)$.

a) $2 \csc(x)$ b) $2 \csc^3(x)$ c) $-2 \csc^3(x)$

d) $-2 \csc^2(x) \cot(x)$ e) $2 \csc^2(x) \cot(x)$

11. Find the derivative (dy/dx or y') for the curve $2x^3 + 2y^3 - 9xy = 0$ at $(1, 2)$.

a) 3 b) 9 c) $\frac{9}{2}$ d) $\frac{1}{3}$ e) $\frac{4}{5}$ f) $\frac{18}{5}$ g) 7 h) $-\frac{18}{5}$

12. Find the derivative of $y = \frac{e^{2x}}{1+x}$

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

13. Find the derivative of $y = x \operatorname{Arctan}(x)$

a) $\frac{1}{1+x^2}$ b) $\tan^{-1}(x) - x \tan^{-2}(x) \sec^2(x)$ c) $-\tan^{-2}(x) \sec^2(x)$

d) $\operatorname{Arctan}(x) + \frac{x}{\sqrt{1-x^2}}$ e) $\operatorname{Arctan}(x) + \frac{x}{1+x^2}$

14. Find $\lim_{h \rightarrow 0} \frac{\frac{1}{2+h} - \frac{1}{2}}{h}$. a) DNE b) $\frac{0}{0}$ c) 1 d) -1 e) $\frac{1}{4}$ f) $-\frac{1}{4}$

15. Find the equation of the line that is tangent to the curve $y = \frac{x-x^2}{2-x}$ at $x = 4$.

a) $y = \frac{x}{2} + 4$ b) $y = \frac{x}{2} - \frac{3}{2}$ c) $y = -2x + \frac{19}{2}$

d) $y = -2x + 14$ e) $y = 2x + 2$ f) $y = 2x - \frac{15}{2}$

16. Evaluate $\lim_{x \rightarrow 4} \frac{x-4}{\sqrt{x}-2}$

a) 0 b) 1 c) 2 d) 3 e) 4 f) 5 g) DNE

Answers

1. c 2. a 3. d 4. c 5. d 6. b 7. b 8. d
9. b 10. d 11. e 12. d 13. e 14. f 15. a 16. e

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} x^2 \cot(x)$. a) 0 b) DNE c) $\frac{1}{2}$ d) 2 e) ∞ f) $-\infty$ g) 1
-
2. The displacement of a particle moving in a straight line is given by $s = t^2 + 2t$. Find the average velocity from $t = 1$ to $t = 3$.
a) 5 b) 6 c) 7 d) 8 e) 9 f) 10
-
3. Find the second derivative of $y = x^2 \ln(x)$. a) $2 + 2 \ln(x)$ b) $3 + 2 \ln(x)$
c) 2 d) $2x \ln(x) + x$ e) $3 + x \ln(x)$ f) $x + 2$
-
4. Evaluate $\lim_{x \rightarrow 1^-} \frac{x - 2}{x(x^3 - 1)}$. a) $-\frac{1}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$
-
5. Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - x^2 - 2x}{x - 2}$.
a) DNE b) $\frac{0}{0}$ c) 0 d) 4 e) 5 f) 6
-
6. Find the derivative of $f(x) = \frac{3}{20}x^{5/3}$ at $x = 8$.
a) 0 b) 1 c) 2 d) 3 e) 4
-
7. Find the slope of the line that is normal to $y = -2(x^2 - 1)^{1/3}$ at $x = 3$.
a) -2 b) -1 c) 0 d) 1 e) 2
-
8. Evaluate $\lim_{x \rightarrow \infty} \frac{x^2 - 3x^3 + x}{x - 2x^2 + 3x^4}$.
a) $\frac{1}{3}$ b) DNE c) 1 d) -1 e) 0
-
9. Find the derivative of $y = \cos^3(x)$.
a) $-3x^2 \sin(x^3)$ b) $3x^2 \sin(x^3)$ c) $3 \sin^2(x)$
d) $3 \cos^2(x) \sin(x)$ e) $-3 \cos^2(x) \sin(x)$
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10. Find the derivative of $y = \cos(x^3)$.

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

d) $3 \cos^2(x) \sin(x)$ e) $-3 \cos^2(x) \sin(x)$

11. Find the derivative (dy/dx or y') for the curve $x^2y^3 - y^2 + xy - 1 = 0$ at $(1, 1)$.

a) 3 b) 2 c) $\frac{3}{2}$ d) $\frac{1}{3}$ e) $-\frac{1}{3}$ f) $\frac{2}{3}$ g) 1 h) $-\frac{3}{2}$

12. Find the derivative of $y = \frac{3x^2 - x}{x + 1}$ at $x = 1$.

a) -2 b) -1 c) 0 d) 1 e) 2 f) 3 g) DNE

13. Find the derivative of $y = e^x \text{Arcsec}(x)$

a) $-\sec^{-2} x \sec x \tan x$ b) $\frac{e^x}{|x|\sqrt{x^2 - 1}} + e^x \text{Arcsec}(x)$ c) $e^x \sec x \tan x + \text{Arcsec}(x)e^x$

d) $\frac{-e^x}{|x|\sqrt{x^2 - 1}} + e^x \text{Arcsec}(x)$ e) $\frac{e^x}{|x|\sqrt{x^2 - 1}}$

14. Find $\lim_{h \rightarrow 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$. a) DNE b) $\frac{0}{0}$ c) $\frac{1}{3}$ d) $-\frac{1}{3}$ e) $\frac{1}{9}$ f) $-\frac{1}{9}$

15. Find the equation of the line that is tangent to the curve $y = \sqrt{x}$ at $x = 4$.

a) $y = \frac{x}{4} + 1$ b) $y = x - 2$ c) $y = \frac{x}{4} - 2$

d) $y = \frac{x}{4} - 1$ e) $y = \frac{x}{4} + 2$ f) $y = x + 2$

16. Evaluate $\lim_{x \rightarrow 4} \frac{4(\sqrt{x} - 2)}{4 - x}$

a) -2 b) -1 c) 0 d) 1 e) 2 f) 3 g) DNE

Answers

1. a 2. b 3. b 4. c 5. f 6. b 7. d 8. e
9. e 10. a 11. h 12. e 13. b 14. f 15. a 16. b

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} 3x \cot(5x)$. a) 0 b) DNE c) $\frac{3}{5}$ d) 3 e) ∞ f) $-\infty$ g) $\frac{5}{3}$
-
2. The displacement of a particle moving in a straight line is given by $s = t^3 - 2t + 1$. Find the instantaneous velocity at $t = 2$.
a) 5 b) 6 c) 7 d) 8 e) 9 f) 10
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3. Find the second derivative of $y = e^x \cos(x)$. a) $e^x \cos(x) - e^x \sin(x)$ b) $-2e^x \sin(x)$
c) $2e^x \sin(x)$ d) $2e^x \cos(x)$ e) $-2e^x \cos(x)$ f) $e^x \sin(x) - x \cos(x)$
-
4. Evaluate $\lim_{x \rightarrow 2^+} \frac{1 - x^3}{x^2(x - 2)}$. a) $-\frac{7}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$
-
5. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{9 - x^2}$.
a) DNE b) $\frac{0}{0}$ c) 0 d) $-\frac{2}{3}$ e) $-\frac{3}{2}$ f) -4
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6. Find the derivative of $f(x) = 16x^{1/2}$ at $x = 16$.
a) 0 b) 1 c) 2 d) 3 e) 4
-
7. Find the slope of the line that is tangent to $y = -\frac{1}{3}(x^3 - 4)^{1/2}$ at $x = 2$.
a) -2 b) -1 c) 0 d) 1 e) 2
-
8. Evaluate $\lim_{x \rightarrow -\infty} \frac{1 - 2x + 3x^2}{3 - x^2 + 2x}$.
a) $\frac{1}{3}$ b) DNE c) $-\infty$ d) 3 e) -3
-
9. Find the derivative of $y = \cot^2(x)$.
a) $-2x \csc^2(x^2)$ b) $-2 \cot^2(x) \csc(x)$ c) $2 \csc^2(x)$
d) $-2 \cot(x) \csc^2(x)$ e) $-2x \csc(x^2) \cot(x^2)$
-

10. Find the derivative of $y = \cot(x^2)$.

a) $-2x \csc^2(x^2)$ b) $-2 \cot^2(x) \csc(x)$ c) $2 \csc^2(x)$

d) $-2 \cot(x) \csc^2(x)$ e) $-2x \csc(x^2) \cot(x^2)$

11. Find the derivative (dy/dx or y') for the curve $x^2y + \frac{y}{x^2} = 4$ at $(1, 2)$.

a) -2 b) -1 c) 0 d) 1 e) 2 f) $\frac{1}{2}$ g) $\frac{1}{3}$ h) $-\frac{3}{2}$

12. Find the derivative of $y = \frac{3x+1}{3-4x}$

a) $-\frac{3}{4}$ b) $\frac{5-24x}{(3-4x)^2}$ c) $\frac{13}{(3-4x)^2}$ d) 13 e) $\frac{12-(3x+1)(3-4x)}{(3-4x)^2}$

13. Find the derivative of $y = \text{Arcsin}(\cos(x))$

a) $\frac{\sin(x)}{\sqrt{1-\cos^2(x)}}$ b) $\text{Arcsin}(x)(-\sin(x)) + \frac{\cos x}{\sqrt{1-x^2}}$ c) $\frac{-\sin(x)}{\sqrt{1-\cos^2(x)}}$

d) $-\sin^{-2}(\cos(x))(-\sin(x))$ e) $\text{Arcsin}(x)(-\sin(x)) - \frac{\cos x}{\sqrt{1-x^2}}$

14. $f(x) = 5x^3 - 5x + 2$. Find $\lim_{h \rightarrow 0} \frac{f(-1+h) - f(-1)}{h}$.

a) DNE b) $\frac{0}{0}$ c) 2 d) 10 e) 20 f) -20

15. Find the equation of the line that is tangent to the curve $y = e^x \ln x$ at $x = 1$.

a) $y = 2ex - e$ b) $y = ex - 2e$ c) $y = 2ex - 2e$

d) $y = ex - e$ e) $y = x - 2e$ f) $y = x + 2e$

16. Evaluate $\lim_{x \rightarrow 9} \frac{1-x^2}{4(1-\sqrt{x})}$

a) 0 b) 1 c) 2 d) 3 e) 4 f) 5 g) DNE

Answers

1. c 2. f 3. b 4. d 5. d 6. c 7. b 8. e
9. d 10. a 11. c 12. c 13. c 14. d 15. d 16. b

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} x^2 \csc(x^2)$. a) 0 b) DNE c) $\frac{1}{2}$ d) 2 e) ∞ f) $-\infty$ g) 1

2. The displacement of a particle moving in a straight line is given by $s = t^2 - t$. Find the average velocity from $t = 1$ to $t = 3$.

a) 3 b) 4 c) 5 d) 6 e) 7 f) 8

3. Find the second derivative of $y = e^{2x}$. a) $2e^{2x}$ b) $2xe^{2x-1}$

c) $2xe^{2x-1} + 2e^{2x-1}$ d) $2e^{4x}$ e) $4e^{4x}$ f) $4e^{2x}$

4. Evaluate $\lim_{x \rightarrow 2^-} \frac{x^2 - 1}{(x - 2)^2}$. a) $\frac{3}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$

5. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - x - 2}$.

a) DNE b) $\frac{0}{0}$ c) 0 d) $\frac{4}{3}$ e) $\frac{3}{4}$ f) 4

6. Find the derivative of $f(x) = 4x^{1/2}$ at $x = 4$.

a) 0 b) 1 c) 2 d) 3 e) 4

7. Find the slope of the line that is tangent to $y = \frac{1}{48}(x^2 + 2)^2$ at $x = 2$.

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

8. Evaluate $\lim_{x \rightarrow -\infty} \frac{x^2 + 2x - 1}{3x + 6x^4}$.

a) $\frac{1}{3}$ b) DNE c) $\frac{1}{6}$ d) $-\infty$ e) 0

9. Find the derivative of $y = \sec(x^2)$.

a) $\sec(2x) \tan(2x)$ b) $2 \sec(x) \tan^2(x)$ c) $2x \sec(x^2) \tan(x^2)$

d) $2 \sec^2(x) \tan(x)$ e) $-\sec(2x) \tan(2x)$

10. Find the derivative of $y = \sec^2(x)$.

- a) $\sec(2x)\tan(2x)$ b) $2\sec(x)\tan^2(x)$ c) $2x\sec(x^2)\tan(x^2)$
d) $2\sec^2(x)\tan(x)$ e) $-\sec(2x)\tan(2x)$
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11. Find the derivative (dy/dx or y') for the curve $(x - y - 1)^3 = x$ at $(1, -1)$.

- a) 3 b) 2 c) $\frac{3}{2}$ d) $\frac{1}{3}$ e) $-\frac{1}{3}$ f) $\frac{2}{3}$ g) 1 h) $-\frac{3}{2}$
-

12. Find the derivative of $y = \frac{x^2 - 2}{2 - x}$ at $x = 1$.

- a) -2 b) -1 c) 0 d) 1 e) 2 f) 3 g) DNE
-

13. Find the derivative of $y = \cot(x)\text{Arctan}(x)$

- a) $\frac{-1}{1+x^2} - \csc(x)\cot(x)$ b) $-\csc x \cot x \text{Arctan}x + \frac{\cot(x)}{1+x^2}$ c) $\frac{\sec(x)\cot(x)}{1+x^2}$
d) $-\csc(\text{Arctan}(x))\cot(\text{Arctan}(x)) \cdot \frac{1}{1+x^2}$ e) $\csc x \cot x \text{Arctan}x - \frac{\cot(x)}{1+x^2}$
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14. $f(x) = 3\sqrt[3]{x^2}$. Find $\lim_{h \rightarrow 0} \frac{f(8+h) - f(8)}{h}$.

- a) DNE b) $\frac{0}{0}$ c) 1 d) $\frac{1}{2}$ e) 2 f) 3
-

15. Find the equation of the line that is tangent to the curve $y = \frac{x+2}{3-x}$ at $x = 2$.

- a) $y = 3x - 2$ b) $y = 5x - 6$ c) $y = 3x - 6$
d) $y = 5x - 2$ e) $y = 4x + 3$ f) $y = 4x - 3$
-

16. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 3}$

- a) 0 b) 1 c) 2 d) 3 e) 4 f) 5 g) DNE
-

Answers

1. g 2. a 3. f 4. d 5. d 6. b 7. d 8. e
9. c 10. d 11. f 12. f 13. b 14. c 15. b 16. a

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} x^2 \csc(3x)$. a) 0 b) DNE c) $\frac{1}{2}$ d) 2 e) ∞ f) $-\infty$ g) 1
-
2. The displacement of a particle moving in a straight line is given by $s = t^2 + 2t + 1$. Find the instantaneous velocity at $t = 2$.
a) 5 b) 6 c) 7 d) 8 e) 9 f) 10
-
3. Find the second derivative of $y = x \cos(x)$. a) $\cos(x) - x \sin(x)$ b) $\cos(x) + x \sin(x)$
c) $-x \cos(x) - 2 \sin(x)$ d) $-2 \sin(x)$ e) $x \cos(x) - 2 \sin(x)$ f) $2 \sin(x)$
-
4. Evaluate $\lim_{x \rightarrow 3^-} \frac{x - 2}{(x^2 - 9)^2}$. a) $\frac{1}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$
-
5. Evaluate $\lim_{x \rightarrow 1} \frac{-x^2 - x - 2}{x^2 - x}$.
a) DNE b) $\frac{0}{0}$ c) 0 d) -1 e) -2 f) -3
-
6. Find the derivative of $f(x) = \frac{1}{5}x^{5/3}$ at $x = 27$.
a) 0 b) 1 c) 2 d) 3 e) 4
-
7. Find the slope of the line that is normal to $y = 4(x - 2)^{1/2}$ at $x = 6$.
a) -2 b) -1 c) 0 d) 1 e) 2
-
8. Evaluate $\lim_{x \rightarrow \infty} \frac{x + x^2 + x^3}{x^2 + x + 1}$.
a) 1 b) DNE c) 0 d) ∞ e) $-\infty$
-
9. Find the derivative of $y = \frac{1}{3} \tan(x^3)$.
a) $x^2 \sec^2(x^3)$ b) $x^2 \sec(x^3) \tan(x^3)$ c) $\frac{1}{3} \sec(3x^2)$
d) $\tan^2(x) \sec^2(x)$ e) $\frac{1}{3} \cot^2(3x^2)$
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10. Find the derivative of $y = \frac{1}{3} \tan^3(x)$.

a) $x^2 \sec^2(x^3)$ b) $x^2 \sec(x^3) \tan(x^3)$ c) $\frac{1}{3} \sec(3x^2)$

d) $\tan^2(x) \sec^2(x)$ e) $\frac{1}{3} \cot^2(3x^2)$

11. Find the derivative (dy/dx or y') for the curve $5x^2 + 4y^2 - 16xy = 16$ at $(0, 2)$.

a) 3 b) 2 c) $\frac{3}{2}$ d) $\frac{1}{3}$ e) $-\frac{1}{3}$ f) $\frac{2}{3}$ g) 1 h) $-\frac{3}{2}$

12. Find the derivative of $y = \frac{e^{3x}}{x-1}$

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

13. Find the derivative of $y = \text{Arctan}(\ln(x))$

a) $\sec^2(x)\ln(x) + \frac{\tan(x)}{x}$ b) $\frac{1}{(1+\ln^2(x))x}$ c) $\frac{\text{Arctan}(x)}{x} - \frac{\ln(x)}{1+x^2}$

d) $\frac{\text{Arctan}(x)}{x} + \frac{\ln(x)}{1+x^2}$ e) $-\tan^{-2}(x)\ln(x) + \frac{\text{Arctan}(x)}{x}$

14. Find $\lim_{h \rightarrow 0} \frac{\ln(\frac{1}{4} + h) - \ln(\frac{1}{4})}{h}$.

a) DNE b) $\frac{0}{0}$ c) $\frac{1}{4}$ d) 1 e) 4 f) $\ln(\frac{1}{4})$

15. Find the equation of the line that is tangent to the curve $y = (x+2)^6$ at $x = -3$.

a) $y = 6x + 19$ b) $y = -6x - 19$ c) $y = 6x - 17$

d) $y = -6x - 17$ e) $y = -6x + 19$ f) $y = -6x + 17$

16. Evaluate $\lim_{x \rightarrow 1} \frac{2(\sqrt{x}-1)}{1-x}$

a) -3 b) -2 c) -1 d) 0 e) 1 f) 2 g) DNE

Answers

1. a 2. b 3. c 4. c 5. f 6. d 7. b 8. d
9. a 10. d 11. b 12. a 13. b 14. e 15. d 16. c

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Calculators are Not Allowed

-
1. Evaluate $\lim_{x \rightarrow 0} x^2 \cot^2(x)$. a) 0 b) DNE c) $\frac{1}{2}$ d) 2 e) ∞ f) $-\infty$ g) 1
-
2. The displacement of a particle moving in a straight line is given by $s = 2t^2 - t$. Find the average velocity from $t = 1$ to $t = 2$.
a) 3 b) 4 c) 5 d) 6 e) 7 f) 8
-
3. Find the second derivative of $y = \ln(3x)$. a) $\arcsin(x)\left(\frac{1}{3x}\right)$ b) $\frac{1}{x} + 3 \ln(3x)$
c) $-\frac{1}{x^2}$ d) $-\frac{1}{3x^2}$ e) $\frac{1}{x}$ f) $3 \ln(x) + \frac{1}{x}$
-
4. Evaluate $\lim_{x \rightarrow -1^-} \frac{x}{x^2 + 3x + 2}$. a) $-\frac{1}{0}$ b) DNE c) $+\infty$ d) $-\infty$ e) $\frac{0}{0}$
-
5. Evaluate $\lim_{x \rightarrow -1} \frac{x^2 + 3x + 2}{x^2 - x - 2}$.
a) DNE b) $\frac{0}{0}$ c) 0 d) 3 e) $-\frac{1}{3}$ f) -3
-
6. Find the derivative of $f(x) = \frac{8}{3}x^{3/4}$ at $x = 16$.
a) 0 b) 1 c) 2 d) 3 e) 4
-
7. Find the slope of the line that is tangent to $y = \frac{-64}{33} (17x^2 - x)^{1/4}$ at $x = 1$.
a) -2 b) -1 c) 0 d) 1 e) 2
-
8. Evaluate $\lim_{x \rightarrow \infty} \frac{9x^3 + 5x^2 - 2}{x - 3x^2 - 5x^3}$.
a) $\frac{9}{5}$ b) DNE c) $-\frac{3}{2}$ d) $-\frac{9}{5}$ e) 9
-
9. Find the derivative of $y = \sin^2(x)$.
a) $\sin(2x)$ b) $2x \cos(x^2)$ c) $2 \sin(x) \cos(x)$
d) $-2 \sin(x) \cos(x)$ e) $-2x \cos(x^2)$
-

10. Find the derivative of $y = \sin(x^2)$.

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

11. Find the derivative (dy/dx or y') for the curve $xy^2 + \frac{x^2}{y} + 3x = 3$ at $(1, -1)$.

- a) -2 b) -1 c) 0 d) 1 e) 2 f) $\frac{1}{2}$ g) $\frac{1}{3}$ h) $-\frac{3}{2}$
-

12. Find the derivative of $y = \frac{x-2}{3x-5}$

- a) $\frac{-11}{(3x-5)^2}$ b) $6x-11$ c) $\frac{3(x-2)-(3x-5)}{(3-4x)^2}$ d) $\frac{1}{3}$ e) $\frac{1}{(3x-5)^2}$
-

13. Find the derivative of $y = \text{Arctan}(x)\ln(x)$

- a) $\sec^2(x)\ln(x) + \frac{\tan(x)}{x}$ b) $\frac{1}{(1+\ln^2(x))x}$ c) $\frac{\text{Arctan}(x)}{x} - \frac{\ln(x)}{1+x^2}$
d) $\frac{\text{Arctan}(x)}{x} + \frac{\ln(x)}{1+x^2}$ e) $-\tan^{-2}(x)\ln(x) + \frac{\text{Arctan}(x)}{x}$
-

14. $f(x) = (2x-3)^6$. Find $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$.

- a) DNE b) $\frac{0}{0}$ c) 6 d) -6 e) 12 f) -12

15. Find the equation of the line that is tangent to the curve $y = \frac{1}{x}$ at $x = 1$.

- a) $y = x + 2$ b) $y = x - 2$ c) $y = -x - 2$
d) $y = x - 1$ e) $y = x + 1$ f) $y = -x + 2$

16. Evaluate $\lim_{x \rightarrow 9} \frac{x-9}{3(\sqrt{x}-3)}$

- a) -3 b) -2 c) -1 d) 0 e) 1 f) 2 g) DNE
-

Answers

1. g 2. c 3. c 4. c 5. e 6. b 7. a 8. d
9. c 10. b 11. d 12. e 13. d 14. f 15. f 16. f

DNE means “Does Not Exist”

Calculators are Not Allowed

1. Evaluate $\lim_{x \rightarrow 0} \frac{\tan(2x)}{x}$. a) 0 b) DNE c) $\frac{1}{2}$ d) 2 e) ∞ f) $-\infty$ g) 1
-
2. The displacement of a particle moving in a straight line is given by $s = t^3 - 3t + 1$. Find the speed when the acceleration is zero.
a) -3 b) 0 c) 1 d) 2 e) 3
-
3. Find the second derivative of $y = \arctan x$
a) $\frac{1}{1+x^2}$ b) $\frac{-x}{1+x^2}$ c) $\frac{-2x}{(1+x^2)^2}$ d) $\frac{x}{(1+x^2)^2}$ e) $\frac{-2x}{1+x^2}$
-
4. Evaluate $\lim_{x \rightarrow 2^-} \frac{x+1}{x^3(x-2)}$
a) $\frac{3}{0}$ b) DNE c) $-\infty$ d) ∞ e) $\frac{0}{0}$
-
5. Evaluate $\lim_{x \rightarrow -6} \frac{x^2 + 11x + 30}{x + 6}$
a) DNE b) 0 c) -1 d) 2 e) 3
-
6. Find the derivative of $f(x) = -\frac{3}{4}x^{\frac{4}{3}}$ at $x = 8$.
a) -2 b) -1 c) 0 d) 1 e) 2
-
7. Find the slope of the line that is tangent to $y = 3x \ln(2x)$ at $x = \frac{1}{2}$
a) 0 b) 1 c) 2 d) 3 e) 4
-
8. Evaluate $\lim_{x \rightarrow \infty} \frac{3x^2 - x^4}{2x - x^3 + 2x^2}$
a) $\frac{3}{2}$ b) -1 c) 1 d) $\frac{1}{2}$ e) ∞
-
9. Find the derivative of $y = \cot(x^4)$
a) $4x^3 \csc^2(x^4)$ b) $-4x^2 \csc^2(x^4)$ c) $4 \csc^2(x^4)$ d) $-4x^3 \csc(x^4)$ e) $-4x^3 \csc(x)$
-

10. Find the derivative of $y = \cot^4(x)$
a) $4 \csc^2(x) \cot^3(x)$ b) $-4 \csc(x) \cot^3(x)$ c) $4 \csc^2(x) \cot(x)$ d) $-4 \csc^2(x) \cot^3(x)$
e) $4 \cot^3(x)$
-

11. Find the derivative of $\frac{dr}{d\theta}$ for the curve $r\theta^3 + r^3\theta + \theta^3 = 3$ at $(1, 0)$
a) -3 b) 0 c) 1 d) 2 e) 3
-

12. Find the derivative of $x^2 \arccos x$
a) $\arcsin x$ b) $\frac{x^3}{\sqrt{1-x^2}}$ c) $2x \arccos x - \frac{x^3}{\sqrt{1-x^2}}$ d) $2x \arccos x + \frac{x^3}{\sqrt{1-x^2}}$
e) $x^2 \arccos x + \frac{x^3}{\sqrt{1-x^2}}$
-

13. Find the derivative of $y = \frac{x^2 - 1}{x^2 + 1}$ at $x = 1$
a) -1 b) 0 c) 1 d) 2 e) 3
-

14. $f(x) = e^{x^2-1}$. Find $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$
a) 0 b) 1 c) 2 d) 3 e) 4
-

15. Find the equation of the tangent line to the curve $y = e^x \sin x$ at $x = 0$.
a) $y = -x + 1$ b) $y = x$ c) $y = x + 1$ d) $y = 2x - 1$ e) $y = x + 2$
-

16. Evaluate $\lim_{x \rightarrow 25} \frac{10(5 - \sqrt{x})}{x - 25}$
a) -1 b) 0 c) 1 d) 2 e) 4
-

Answers

1. d 2. e 3. c 4. c 5. c 6. d 7. d 8. e
9. d 10. d 11. d 12. a 13. c 14. c 15. b 16. a

MATH 1610 Practice Midterm 8

1. Evaluate $\lim_{x \rightarrow 0} x \csc(4x)$.

- (a) 0 (b) DNE (c) $\frac{1}{4}$ (d) 4 (e) ∞ (f) $-\infty$ (g) 1
-

2. A particle in motion has position $s = t^2 - t$. Find its average velocity from $t = 1$ to $t = 4$.

- (a) 4 (b) 5 (c) 6 (d) 7 (e) 8 (f) 9
-

3. Find the second derivative of $y = \sin 3x$.

- (a) $3 \cos(3x)$ (b) $-\sin(3x)$ (c) $-3 \sin(3x)$ (d) $-9 \sin(3x)$ (e) $9 \sin(3x)$ (f) $9 \cos(3x)$
-

4. Evaluate $\lim_{x \rightarrow -3^-} \frac{x}{x+3}$.

- (a) $-\frac{3}{0}$ (b) DNE (c) ∞ (d) $-\infty$ (e) $\frac{0}{0}$
-

5. Evaluate $\lim_{x \rightarrow 1} \frac{x^3 - x}{x - 1}$.

- (a) 1 (b) 2 (c) 3 (d) 4 (e) $\frac{0}{0}$ (f) DNE
-

6. Find the derivative of $24x^{\frac{1}{3}}$ at $x = 8$.

- (a) 0 (b) 1 (c) 2 (d) 3 (e) 4
-

7. Find the slope that is normal to the curve $y = \frac{2}{5}(x^2 + 6x)^{\frac{1}{2}}$ at $x = 2$.

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

8. Evaluate $\lim_{x \rightarrow \infty} \frac{1 + x - 3x^3}{4x^3 + x^2 + 1}$.

- (a) $\frac{1}{4}$ (b) DNE (c) $-\frac{3}{4}$ (d) $\frac{3}{4}$ (e) 0
-

9. Find the derivative of $y = \sec(x^2)$.

- (a) $-\csc(x^2) \cot(x^2)$ (b) $-2x \sec^3(x^2)$ (c) $\sec(x^2) \tan(x^2)$ (d) $-2x \csc(x^2) \cot(x^2)$
(e) $2x \sec(x^2) \tan(x^2)$
-

10. Find the derivative of $y = \sec^2 x$.

- (a) $2 \sec x \tan x$ (b) $2 \sec^2 x \tan x$ (c) $-2 \sec x \csc^2 x$ (d) $2 \cot^2 x$ (e) $-2 \sec x \tan x$
-

11. Find the derivative ($\frac{dy}{dx}$ or y') for the curve $2x^3 + 2y^3 - 9xy = 0$ at $(1, 1)$.
 (a) 7 (b) $-\frac{1}{2}$ (c) $\frac{1}{2}$ (d) -1 (e) -7 (f) DNE
-
12. Find the derivative of $y = \frac{e^{2x}}{3+x}$.
 (a) $\frac{e^{2x}(5+2x)}{(3+x)^2}$ (b) e^{2x} (c) $\frac{(3+x)2xe^{2x-1}-e^{2x}}{(3+x)^2}$ (d) $\frac{xe^{2x}}{(3+x)^2}$
-
13. Find the derivative of $y = x \operatorname{arccot}(x)$.
 (a) $\frac{-1}{1+x^2}$ (b) $\cot^{-1}(x) - x \cot^{-2}(x)$ (c) $\operatorname{arccot}(x) + \frac{-x}{\sqrt{1-x^2}}$ (d) $\operatorname{arccot}(x) - \frac{x}{1+x^2}$
-
14. Find $\lim_{h \rightarrow 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$.
 (a) DNE (b) $\frac{0}{0}$ (c) 1 (d) -1 (e) $-\frac{1}{9}$ (f) $\frac{1}{9}$
-
15. Find the equation of the line that is tangent to the curve $y = \frac{x-x^2}{2-x}$ at $x = 3$.
 (a) $y = -x + 9$ (b) $y = -1$ (c) $y = \frac{x}{2} - \frac{3}{2}$ (d) $y = -2x + 3$ (e) $y = 2x + 2$
-
16. Evaluate $\lim_{x \rightarrow 9} \frac{x-9}{\sqrt{x}-3}$.
 (a) 0 (b) DNE (c) 6 (d) 5 (e) 4 (f) 3
-

Answers

1. c 2. a 3. d 4. c 5. b 6. c 7. e 8. c
 9. e 10. b 11. f 12. a 13. d 14. e 15. a 16. c

MATH 1610 Practice Midterm 9

1. Evaluate $\lim_{x \rightarrow 0} \frac{5 \tan x}{6x}$.
2. The displacement of a particle moving in a straight line is given by $s = t^3 - 3t + 4$. Find the average velocity from $t = 2$ to $t = 4$, the velocity when $t = 3$, and the acceleration when $t = 4$.
3. Find the second derivative of $y = x \cos 2x$.
4. Evaluate $\lim_{x \rightarrow 3^+} \frac{x + 2}{x(x - 3)}$.
5. Evaluate $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 15}{x^2 - 9}$.
6. Find the derivative of $8x^{\frac{3}{4}}$ at $x = 16$.
7. Find the slope that is normal to the curve $y = \ln(3x^3 + 4x)$ at $x = 2$.
8. Evaluate $\lim_{x \rightarrow \infty} \frac{x^3 + 4x - 15}{8x + x^4 - 9}$.
9. Find the derivative of $y = \sec(x^3)$.
10. Find the derivative of $y = \sec^3 x$.
11. Find the derivative ($\frac{dy}{dx}$ or y') for the curve $x^2 + 2xy - y^2 + x = 2$ at $(1, 2)$.
12. Find the derivative of $y = \frac{1-2x^2}{4x+4}$.
13. Find the derivative of $y = \arctan(e^x)$.
14. Let $f(x) = (x + 3)^2$. Find $\lim_{h \rightarrow 0} \frac{f(2 + h) - f(2)}{h}$.
15. Find the equation of the line that is tangent to the curve $y = \frac{x+1}{x+2}$ at $x = 3$.
16. Evaluate $\lim_{x \rightarrow 4} \frac{\sqrt{x+5} - 3}{4 - x}$.

Answers:

- | | | | |
|---|-------------------|-------------------------------------|---|
| 1. $\frac{5}{6}$ | 5. $\frac{4}{3}$ | 9. $3x^2 \sec(x^3) \tan(x^3)$ | 13. $\frac{e^x}{1+e^{2x}}$ |
| 2. $avg. vel = 25, v = 24,$
$a = 24$ | 6. 3 | 10. $3 \sec^3(x) \tan x$ | 14. 10 |
| 3. $-4(x \cos 2x + \sin 2x)$ | 7. $-\frac{4}{5}$ | 11. $\frac{7}{2}$ | 15. $y = \frac{1}{25}x + \frac{17}{25}$ |
| 4. ∞ | 8. 0 | 12. $\frac{-4(x^2+4x+1)}{(4x+4)^4}$ | 16. $-\frac{1}{6}$ |