Math 4 Honors
Lesson 7-1 Quiz Practice Answers

Name _____
Date _____

ASU Arizona State University

MAT 270 - Derivative Practice I Solutions

1. $f(x)=4x^3-3x^2+2x-\pi$

$f'(x)=12x^2-6x+2$

2. $f(x)=\frac{x^2}{3}-\frac{3}{x^2}$

$f'(x)=\frac{2}{3}x+\frac{6}{x^3}$

3. $f(x)=-3(2x^2-5x+1)$

$f'(x)=-12x+15$

4. $f(x)-\sqrt{x}-\frac{1}{\sqrt{x}}$

$f'(x)=\frac{1}{2\sqrt{x}}+\frac{1}{2x\sqrt{x}}$

5. $f(x)=\frac{x+1}{x-2}$

$f'(x)=\frac{-3}{(x-2)^2}$

6. $f(x)=\frac{x^2-2}{x^2}$

$f'(x)=\frac{4}{x^3}$

7. $f(x)=\frac{x^2}{x^2-2}$

$f'(x)=\frac{-4x}{(x^2-2)^2}$

8. $f(x)=\sqrt{x}(x^2+1)$

$f'(x)=\frac{5x\sqrt{x}}{2}+\frac{1}{2\sqrt{x}}$

9. $f(x)=\frac{e^x}{e^x-1}$

$f'(x)=\frac{-e^x}{(e^x-1)^2}$

10. $f(x)=\frac{2}{\sqrt{x}}+\frac{\sqrt{x}}{2}$

$f'(x)=\frac{-1}{x\sqrt{x}}+\frac{1}{4\sqrt{x}}$

11. $f(x)=\frac{2x}{x-1}$

$f'(x)=\frac{-2}{(x-1)^2}$

12. $f(x)=(3x-2)(2x+1)$

$f'(x)=12x-1$

13. $y=5x^2-5\sqrt{x}-\frac{3}{x}$

$y'=10x-\frac{5}{2\sqrt{x}}+\frac{3}{x^2}$

14. $y-\frac{\sqrt{x}}{\sqrt{x}-1}$

$y'=\frac{-1}{2\sqrt{x}(\sqrt{x}-1)^2}$

15. $y=\frac{e^x}{x}$

$y'=\frac{e^x}{x}-\frac{e^x}{x^2}$

16. $y=6x^{\frac{-3}{2}}+7x^{\frac{1}{5}}+1$

$y'=-9x^{\left(\frac{-5}{2}\right)}+\frac{7}{5}x^{\left(\frac{-4}{5}\right)}$

17. $y=\frac{-7}{1-x^3}$

$y'=\frac{-21x^2}{(1-x^3)^2}$

18. $y=\frac{4}{3}x^{\left(\frac{3}{4}-\pi\right)}$

$\left(1-\frac{4}{3}\pi\right)x^{\left(\frac{-1}{4}-\pi\right)}$

19. $y=\frac{1}{7x}$

$y'=\frac{-1}{7x^2}$

20. $y=2x^{\left(\frac{1}{2}-e\right)}$

$y'=(1-2e)x^{\left(\frac{-1}{2}-e\right)}$

Practice I

1. $f'(x) = 12x^2 - 6x + 2$

2. $f(x) = \frac{1}{3}x^2 - 3x^{-2}$

$f'(x) = \frac{2}{3}x + 6x^{-3} = \frac{2}{3}x + \frac{6}{x^3}$

3. $f(x) = -4x^2 + 15x - 3$

$f'(x) = -12x + 15$

4. $f(x) = x^{\frac{1}{2}} - x^{-\frac{1}{2}}$

$f'(x) = \frac{1}{2}x^{-\frac{1}{2}} + \frac{1}{2}x^{-\frac{3}{2}}$

$= \frac{1}{2\sqrt{x}} + \frac{1}{2\sqrt{x^3}}$

5. $f'(x) = \frac{1(x-2) - 1(x+1)}{(x-2)^2}$

$= \frac{x - 2 - x - 1}{(x-2)^2}$

$= \frac{-3}{(x-2)^2}$

6. $f'(x) = 1 - 2x^{-2}$

$= 4x^{-3} = \frac{4}{x^3}$

7. $f'(x) = \frac{2x(x^2-2) - (2x)(x^2)}{(x^2-2)^2}$

$= \frac{2x^3 - 4x - 2x^3}{(x^2-2)^2} = \frac{-4x}{(x^2-2)^2}$

8. $f(x) = x^{\frac{1}{2}}(x^2+1)$

$f'(x) = \frac{1}{2}x^{-\frac{1}{2}}(x^2+1) + x^{\frac{1}{2}}(2x)$

$= x^{-\frac{1}{2}}\left(\frac{1}{2}(x^2+1) + x(2x)\right)$

$= x^{-\frac{1}{2}}\left(\frac{1}{2}x^2 + \frac{1}{2} + 2x^2\right)$

$= x^{-\frac{1}{2}}\left(\frac{5}{2}x^2 + \frac{1}{2}\right)$

9. $f'(x) = \frac{e^x(e^x-1) - e^x(e^x)}{(e^x-1)^2}$

$= \frac{e^{2x} - e^x - e^{2x}}{(e^x-1)^2} = \frac{-e^x}{(e^x-1)^2}$

10. $f(x) = 2x^{\frac{1}{2}} + \frac{1}{2}x^{\frac{1}{2}}$

$f'(x) = -x^{-\frac{3}{2}} + \frac{1}{4}x^{-\frac{1}{2}} = \frac{-1}{\sqrt{x^3}} + \frac{1}{4\sqrt{x}}$

11. $f'(x) = \frac{2(x-1) - 1\cdot 2x}{(x-1)^2} = \frac{2x-2-2x}{(x-1)^2} = \frac{-2}{(x-1)^2}$

12. $f'(x) = 3(2x+1) + 2(3x-2)$

$= 6x + 3 + 6x - 4 = 12x - 1$

13. $y = 5x^2 - 5x^{\frac{1}{2}} - 3x^{-1}$

$y' = 10x - \frac{5}{2}x^{-\frac{1}{2}} + 3x^{-2} = 10x - \frac{5}{2\sqrt{x}} + \frac{3}{x^2}$

14. $y = \frac{x^{\frac{1}{2}}}{x^{\frac{1}{2}} - 1}$ / $y' = \frac{\frac{1}{2}x^{-\frac{1}{2}}(x^{\frac{1}{2}} - 1) - \frac{1}{2}x^{-\frac{1}{2}}(x^{\frac{1}{2}})}{(x^{\frac{1}{2}} - 1)^2}$

$= \frac{\frac{1}{2} - \frac{1}{2}x^{-\frac{1}{2}} - \frac{1}{2}}{(x^{\frac{1}{2}} - 1)^2} = \frac{-1}{2\sqrt{x}(\sqrt{x} - 1)^2}$

15. $y = \frac{e^x}{x}$ / $y' = \frac{e^x \cdot x - 1 \cdot e^x}{x^2}$

$= \frac{e^x(x-1)}{x^2}$

16. $y' = -9x^{-\frac{5}{2}} + \frac{7}{5}x^{-\frac{4}{5}}$

$= \frac{-9}{\sqrt{x^5}} + \frac{7}{5\sqrt[5]{x^4}}$

17. $y' = \frac{0(1-x^3) - (-3x^2)(-7)}{(1-x^3)^2} = \frac{-21x^2}{(1-x^3)^2}$

18. $y' = \frac{4}{3}\left(\frac{3}{4} - \pi\right)x^{\left(\frac{3}{4} - \pi - 1\right)}$

$= \left(1 - \frac{4}{3}\pi\right)x^{\left(-\pi - \frac{1}{4}\right)}$

19. $y = \frac{1}{7}x^{-1}$ $y' = -\frac{1}{7}x^{-2} = -\frac{1}{7x^2}$

20. $y' = \left(\frac{1}{2} - e\right)(2)x^{\left(\frac{1}{2} - e - 1\right)}$

$= (1 - 2e)x^{-\frac{1}{2} - e}$

Calculus AB Exam Practice

1. If $y = (x^3+1)^2$, then $\frac{dy}{dx} =$

(A) $(3x^2)^2$ (B) $6x^2(x^3+1)$ (C) $2(3x^2+1)$

(D) $3x^2(x^3+1)$ (E) $2(x^3+1)$

Chain Rule

$\frac{dy}{dx} = 2(x^3+1)^1 \cdot 3x^2 = 6x^2(x^3+1)$

$\star \frac{d}{dx}(x^3+1)$

2. If $f(x) = \ln(x+4+e^{-3x})$, then $f'(0)$ is

(A) $-\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{2}{5}$ (E) nonexistent

$\frac{d}{dx}(x+4+e^{-3x})$

$\star e^0 = 1$

$f'(x) = \frac{1}{x+4+e^{-3x}} \cdot (1+e^{-3x} \cdot -3) = \frac{1}{x+4+e^{-3x}} \cdot (1-3e^{-3x})$

$f'(0) = \frac{1}{0+4+e^0} \cdot (1-3 \cdot e^0) = \frac{-2}{5}$

3. If $M(x) = g(f(x))$, then $M'(1) =$ (Use the values from the table.)

x	f	f'	g	g'
0	2	1	5	−4
1	3	2	3	−3
2	5	3	1	−2
3	10	4	0	−1

(A) 2 (B) 6 (C) 4 (D) 6 (E) 12

Chain Rule!

$M'(x) = g'(f(x)) \cdot f'(x)$

Choices are messed up!

$M'(1) = g'(f(1)) \cdot f'(1)$

$= g'(3) \cdot 2 = -1 \cdot 2 = -2$

4. Find $\frac{dy}{dx}$ if $y = \frac{1+x^2}{1-x^2}$ Quotient Rule

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

(D) $\frac{2x}{(1-x)^2}$ (E) Correct answer not given

$= \frac{2x+2x}{(1-x^2)^2} = \frac{4x}{(1-x^2)^2}$

5. Find $\frac{dy}{dx}$ if $y = x^2 \ln x$ product Rule!

$\frac{dy}{dx} = 2x \ln x + x^2 \cdot \frac{1}{x} = 2x \ln x + x$

(A) $x(1+2\ln x)$ (B) $x^2 + 2x\ln x$ (C) $\frac{1}{x} \cdot \ln x$

(D) $2\ln x + x^2$ (E) $e^x + 2x$

Factor

$x(2\ln x + 1)$