Key A 25pts

A.P. Calculus AB **Quiz 5-1 and 5-3**

NO CALCULATORS. Each question is worth 5 points. All answers must be justified to receive full credit.

Name _____ period _____

1. State the domain of $\ln(4x-3)$

$4x-3=0$

$x=3/4$

$(3/4, \infty)$

2. Find $\frac{dy}{dx}$ if $y=\ln\sqrt[4]{\frac{5-3x}{2x^2-7}}$

$=\ln\left(\frac{5-3x}{2x^2-7}\right)^{1/4}$

$y=\frac{1}{4}\ln(5-3x)-\frac{1}{4}\ln(2x^2-7)$

$y'=\frac{1}{4}\cdot\frac{-3}{5-3x}-\frac{1}{4}\cdot\frac{4x}{2x^2-7}$

$\frac{-3}{4(5-3x)}-\frac{x}{2x^2-7}$

3. Find $\frac{dy}{dx}$ if $y=x^{\sqrt{2x-3}}$

$\ln y=\ln x^{(2x-3)^{1/2}}$

$\ln y=(2x-3)^{1/2}\cdot\ln x$

$\frac{1}{y}\cdot\frac{dy}{dx}=\frac{1}{2}(2x-3)^{-1/2}(2)\cdot\ln x+(2x-3)^{1/2}\cdot\frac{1}{x}$

$\frac{dy}{dx}=x^{\sqrt{2x-3}}\left[\frac{\ln x}{(2x-3)^{1/2}}+\frac{(2x-3)^{1/2}}{x}\right]$

$\frac{dy}{dx}=y\cdot\left[\frac{\ln x}{(2x-3)^{1/2}}+\frac{(2x-3)^{1/2}}{x}\right]$

4. $g(x)=\sqrt{3x-4}+5$ has an inverse function, $g^{-1}(x)$. Find $g^{-1}(x)$

$y=(3x-4)^{1/2}+5$

$x=(3y-4)^{1/2}+5$

$x-5=\sqrt{3y-4}$

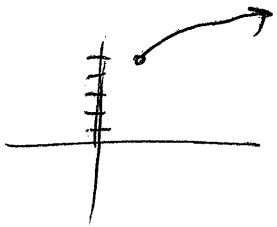
$(x-5)^2=3y-4$

$y=\frac{(x-5)^2+4}{3}$

$\frac{(x-5)^2+4}{3}$

State the domain of $g^{-1}(x)$

$[5, \infty)$



5. If $h(x)=x^5-3x^3+5$, find $\frac{d}{dx}h^{-1}(-3)$

$h(-2)=-3$ | $(h^{-1})(-3)=-2$

$h'(-2)=44$ | $(h^{-1})'(-3)=\frac{1}{44}$

$h'(x)=5x^4-9x^2$

$h'(-2)=5(-2)^4-9(-2)^2$

$=44$

25 pts

A.P. Calculus AB **Quiz 5-1 and 5-3** Key C

NO CALCULATORS. Each question is worth 5 points. Name _____ period _____

All answers must be justified to receive full credit.

1. State the domain of $\ln(2x-7)$ $2x-7=0$, $x=7/2$ $(7/2, \infty)$

2. Find $\frac{dy}{dx}$ if $y=\ln\sqrt[5]{\frac{5-2x}{12-7x^3}}$ $\ln\left(\frac{5-2x}{12-7x^3}\right)^{1/5}$

$y=\frac{1}{5}\ln(5-2x)-\frac{1}{5}\ln(12-7x^3)$

$y'=\frac{-2}{5(5-2x)}+\frac{21x^2}{5(12-7x^3}$

$y'=\frac{1}{5}\cdot\frac{-2}{5-2x}-\frac{1}{5}\cdot\frac{-21x^2}{12-7x^3}$

3. Find $\frac{dy}{dx}$ if $y=x^{\sqrt{3-2x}}$ $=x^{(3-2x)^{1/2}}$

$\frac{dy}{dx}=x^{\sqrt{3-2x}}\left[\frac{-\ln x}{(3-2x)^{1/2}}+\frac{(3-2x)^{1/2}}{x}\right]$

$\ln y=\ln x^{(3-2x)^{1/2}}$

$\ln y=(3-2x)^{1/2}\cdot\ln x$

$\frac{dy}{dx}=y\left[\frac{-\ln x}{(3-2x)^{1/2}}+\frac{\sqrt{3-2x}}{x}\right]$

$\frac{1}{y}\frac{dy}{dx}=\frac{1}{2}(3-2x)^{-1/2}(-2)\ln x+(3-2x)^{1/2}\left(\frac{1}{x}\right)$

4. $g(x)=\sqrt{2x-7}-2$ has an inverse function, $g^{-1}(x)$. Find $g^{-1}(x)$ $=\frac{(x+2)^2+7}{2}$

State the domain of $g^{-1}(x)$ $[-2, \infty)$

$y=\sqrt{2x-7}-2$

$x=\sqrt{2y-7}-2$ | $(x+2)^2=2y-7$

$x+2=\sqrt{2y-7}$ | $\frac{(x+2)^2+7}{2}$

5. If $f(x)=2x^5-2x^2+3$, find $\frac{d}{dx}f^{-1}(-1)$ $-1=2x^5-2x^2+3$

$-1=-2+2+3$

$f(-1)=-1$ | $(f^{-1})(-1)=$ ____

$f'(-1)=14$ | $(f^{-1})'(-1)=\boxed{\frac{1}{14}}$

Key B. 25 pts

A.P. Calculus AB **Quiz 5-1 and 5-3**

NO CALCULATORS. Each question is worth 5 points. All answers must be justified to receive full credit.

Name _____ period _____

1. State the domain of $\ln(7x-4)$ $7x-4=0$, $x=4/7$ $(4/7, \infty)$

2. Find $\frac{dy}{dx}$ if $y=\ln\sqrt[3]{\frac{x-4x^3}{9-2x}}$ $= \ln\left(\frac{x-4x^3}{9-2x}\right)^{1/3}$

$y=\frac{1}{3}\ln(x-4x^3)-\frac{1}{3}\ln(9-2x)$

$y'=\frac{1}{3}\cdot\frac{1-12x^2}{x-4x^3}-\frac{1}{3}\cdot\frac{-2}{9-2x}$ $\frac{1-12x^2}{3(x-4x^3)}+\frac{2}{3(9-2x)}$

3. Find $\frac{dy}{dx}$ if $y=x^{\sqrt{4-3x}}$ $y=x^{(4-3x)^{1/2}}$

$\ln y=\ln x^{(4-3x)^{1/2}}$

$\ln y=(4-3x)^{1/2}\cdot\ln x$

$\frac{1}{y}\left(\frac{dy}{dx}\right)=\frac{1}{2}(4-3x)^{-1/2}(-3)\ln x+(4-3x)^{1/2}\cdot\frac{1}{x}$

$\frac{dy}{dx}=y\cdot\left[\frac{-3\ln x}{2\sqrt{4-3x}}+\frac{\sqrt{4-3x}}{x}\right]$

$\frac{dy}{dx}=x^{\sqrt{4-3x}}\left[\frac{-3\ln x}{2(4-3x)^{1/2}}+\frac{(4-3x)^{1/2}}{x}\right]$

4. $g(x)=\sqrt{3x-7}+2$ has an inverse function, $g^{-1}(x)$. Find $g^{-1}(x)$ $\frac{(x-2)^2+7}{3}$

$x=\sqrt{3y-7}+2$

$x-2=\sqrt{3y-7}$

$(x-2)^2=3y-7$

$\frac{(x-2)^2+7}{3}=g^{-1}(x)$

State the domain of $g^{-1}(x)$ $[2, \infty)$

5. If $f(x)=x^5-3x^3+5$, find $\frac{d}{dx}f^{-1}(3)$

$3=x^5-3x^3+5$ $2^5=32-24+5$

$f(1)=3$ $(f^{-1})(3)=1$

$f'(x)=5x^4-9x^2$

$f'(1)=5-9=-4$

$f'(1)=-4$ $(f^{-1})'(3)=-1/4$

20/20

A.P. Calculus AB **Quiz 5-4, 5-5**

No Calculators! Each question is worth 5 points.

Key A 11/5/18 1st

Name Date Per

For each function, find $\frac{dy}{dx}$.

1. $y = \ln\left(\frac{\sqrt[3]{x^2-7x+4}}{2x^3+6}\right)$

$\ln \frac{(x^2-7x+4)^{1/3}}{2x^3+6}$ $\ln \frac{1}{3}(x^2-7x+4) - \ln(2x^3+6)$

$\ln \frac{1}{3}\left(\frac{2x-7}{x^2-7x+4}\right) - \ln\left(\frac{6x^2}{2x^3+6}\right)$

$\frac{dy}{dx} = \left[\frac{2x-7}{3(x^2-7x+4)} - \frac{6x^2}{2x^3+6}\right]$

2. $y = \overbrace{(x^2)}^{f}\overbrace{(5^{(3x^3+2x^2)})}^{g}$

$(2x)5^{(3x^3+2x^2)} + x^2(\ln 5)(5^{(3x^3+2x^2)})(9x^2+4x)$

$5^{3x^3+2x^2}[2x + x^2(\ln 5)(9x^2+4x)]$

$\frac{dy}{dx} = 5^{(3x^3+2x^2)}[2x + (x^2)(\ln 5)(9x^2+4x)]$

3. $y = \log_6(\sqrt{x^2-7x+20})$

$y = \log_6(x^2-7x+20)^{1/2}$

$\frac{1}{2}\frac{1}{\ln 6}(x^2-7x+20)$ $\frac{1}{2\ln 6}\cdot\left(\frac{2x-7}{x^2-7x+20}\right)$

$\frac{dy}{dx} = \frac{2x-7}{2\ln 6(x^2-7x+20)}$

4. $y = e^{(3x^5-3x^2-5)}$

$e^{(3x^5-3x^2-5)}(15x^4-6x)$

$\frac{dy}{dx} = e^{(3x^5-3x^2-5)}(15^4-6x)$

A.P. Calculus AB **Quiz 5-4, 5-5**
No Calculators! Each question is worth 5 points.

key B
Name 11/5/18 Date 1 Per

20/20

For each function, find $\frac{dy}{dx}$.

1. $y = \ln\left(\frac{\sqrt[4]{x^3-5x+6}}{3x^5+10}\right)$

$\frac{1}{4}\ln(x^3-5x+6) - \ln(3x^5+10)$

$\frac{1}{4}\left(\frac{3x^2-5}{x^3-5x+6}\right) - \left(\frac{15x^4}{3x^5+10}\right)$

$\left(\frac{3x^2-5}{4x^3-20x+24}\right) - \left(\frac{15x^4}{3x^5+10}\right)$

2. $y = (x^3)(6^{(5x^3-2x^2)})$

$(3x^2)(6^{(5x^3-2x^2)}) + x^3(\ln 6)(6^{5x^3-2x^2})(15x^2-4x)$

$x^2(6^{(5x^3-2x^2)})(3+x(\ln 6)(15x^2-4x)$

$x^2(6^{(5x^3-2x^2)})(3+x(\ln 6)(15x^2-4x)$

3. $y = \log_3(\sqrt{x^2+9x-5})$

$\log_3(x^2+9x-5)^{\frac{1}{2}}$

$\frac{1}{2}\cdot\frac{1}{\ln 3}\cdot\frac{2x+9}{x^2+9x-5}$ $\frac{2x+9}{2\ln 3(x^2+9x-5)}$

$\frac{2x+9}{2\ln 3(x^2+9x-5)}$

4. $y = e^{(3x^4-4x^2-1)}$

$e^{3x4-4x^2-1}(12x^3-8x)$

$e^{(3x4-4x^2-1)}(12x^3-8x)$

A.P. Calculus AB **Quiz 5-4, 5-5**
No Calculators! Each question is worth 5 points.

Key C 11/5/18 5th 20/20
Name Date Per

For each function, find $\frac{dy}{dx}$.

1. $y = \ln\left(\frac{\sqrt[5]{x^4+4x-3}}{6x^2+8}\right)$

$\ln(x^4+4x-3)^{1/5} - \ln(6x^2+8)$

$\frac{1}{5}\ln(x^4+4x-3) - \ln(6x^2+8)$

$\frac{4x^3+4}{5(x^4+4x-3)} - \frac{12x}{6x^2+8}$

$\frac{dy}{dx} = \frac{4x^3+4}{5(x^4+4x-3)} - \frac{12x}{6x^2+8}$

2. $y = (x^4)(3^{(3x^3+2x^2)})$

$(4x^3)(3^{(3x^3+2x^2)}) + (x^4)(\ln 3)(3^{(3x^3+2x^2)})(9x^2+4x)$

$(3^{(3x^3+2x^2)})[4x^3 + (x^4)(\ln 3)(9x^2+4x)]$

$\frac{dy}{dx} = 3^{(3x^3+2x^2)}[4x^3 + (x^4)(\ln 3)(9x^2+4x)]$

3. $y = \log_2(\sqrt{5x^2-9x+14})$

$\log_2(5x^2-9x+14)^{1/2}$

$\frac{1}{2}\log_2(5x^2-9x+14)$

$\frac{1}{2\ln 2}\left(\frac{10x-9}{5x^2-9x+14}\right)$

$\frac{dy}{dx} = \frac{10x-9}{(2\ln 2)(5x^2-9x+14)}$

4. $y = e^{(6x^3-3x^2-4x)}$

$(e^{(6x^3-3x^2-4x)})(18x^2-6x-4)$

$\frac{dy}{dx} = (e^{(6x^3-3x^2-4x)})(18x^2-6x-4)$

$\ln u = \frac{u'}{u}$ ✓ | $e^u = e^u(u')$

$\log_a a = \frac{1}{\ln a}\left(\frac{u'}{u}\right)$ ✓ | $a^u = (\ln a)(a^u)(u')$ ✓

A.P. Calculus AB **Quiz 5-4, 5-5**
No Calculators! Each question is worth 5 points.

Key D 11/5/18 5
Name Date Per

For each function, find $\frac{dy}{dx}$.

1. $y = \ln\left(\frac{\sqrt[7]{x^2+6x-3}}{5x^3+8}\right)$

$y = \ln\left(\frac{(x^2+6x-3)^{\frac{1}{7}}}{5x^3+8}\right)$

$y = \frac{1}{7}\ln(x^2+6x-3) - \ln(5x^3+8)$

$y' = \frac{1}{7}\left(\frac{2x+6}{x^2+6x-3}\right) - \left(\frac{15x^2}{5x^3+8}\right)$

$y' = \frac{2x+6}{7(x^2+6x-3)} - \frac{15x^2}{5x^3+8}$

$\frac{dy}{dx} = \frac{2x+6}{7(x^2+6x-3)} - \frac{15x^2}{5x^3+8}$

2. $y = \sqrt[5]{(x^5)}\sqrt[9]{(8^{(4x^2+7x)})}$

$y' = 5x^4(8^{(4x^2+7x)}) + (x^5)(\ln 8)(8^{4x^2+7x})(8x+7)$

$y' = x^4 \cdot 8^{4x^2+7x}\left(5 + (x)\ln 8(8x+7)\right)$

$\frac{dy}{dx} = x^4 \cdot 8^{4x^2+7x}\left[5 + (x)\ln 8(8x+7)\right]$

3. $y = \log_5(\sqrt{3x^2-7x+4})$

$y = \log_5(3x^2-7x+4)^{\frac{1}{2}}$

$y = \frac{1}{2}\log_5(3x^2-7x+4)$

$y' = \frac{1}{2}\left(\frac{1}{\ln 5}\right)\left(\frac{6x-7}{3x^2-7x+4}\right)$

$y' = \frac{6x-7}{2(\ln 5)(3x^2-7x+4)}$

$\frac{dy}{dx} = \frac{6x-7}{(2)\ln 5(3x^2-7x+4)}$

4. $y = e^{(5x^4-2x^2-1)}$

$y' = e^{5x^4-2x^2-1}(20x^3-4x)$

$\frac{dy}{dx} = e^{5x^4-2x^2-1}(20x^3-4x)$