Student: Cole Lamers **Date:** 09/11/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 3.6 The Chain Rule

1.

Given $y = f(u)$ and $u = g(x)$, find $\dfrac{dy}{dx} = f\,'(g(x))\ g\,'(x)$.

$y = 6u - 1, \quad u = \left(\dfrac{1}{2}\right) x^4$

$\dfrac{dy}{dx} = \boxed{\quad 12x^3 \quad}$

2.

Given $y = f(u)$ and $u = g(x)$, find $\dfrac{dy}{dx} = f'(g(x))g'(x)$ for the following functions.

$y = \mathbf{sin}\ u, \ u = 7x + 6$

$\dfrac{dy}{dx} = f'(g(x))g'(x) = \boxed{\ 7\,\mathbf{cos}\,(7x + 6)\ }$

3.

Given $y = f(u)$ and $u = g(x)$, find $\dfrac{dy}{dx} = f'(g(x))g'(x)$.

$y = \sqrt[5]{u^4}, \quad u = \mathbf{cos}\ x$

$\dfrac{dy}{dx} = \boxed{\quad -\dfrac{4\,\mathbf{sin}\,x}{5\sqrt[5]{\mathbf{cos}\,x}} \quad}$

4.

Write the function below in the form $y = f(u)$ and $u = g(x)$, then find $\dfrac{dy}{dx}$ as a function of x.

$y = (5x + 19)^6$

Write $y = (5x + 19)^6$ in the form $y = f(u)$ and $u = g(x)$. Choose the correct functions f(u) and g(x) below.

○ **A.** $f(u) = (u + 19)^6$
　　$g(x) = 5x$

○ **B.** $f(u) = 5u^6$
　　$g(x) = x + 19$

○ **C.** $f(u) = 5u + 19$
　　$g(x) = x^6$

✔ **D.** $f(u) = u^6$
　　$g(x) = 5x + 19$

$\dfrac{dy}{dx} = \boxed{\quad 30(5x + 19)^5 \quad}$

5.

Use the Chain Rule to calculate $\dfrac{dy}{dx}$.

$y = (6x + 5)^{11}$

$\dfrac{dy}{dx} = \boxed{\quad 66(6x + 5)^{10} \quad}$

6.
Write the function in the form y = f(u) and u = g(x). Then find $\frac{dy}{dx}$ as a function of x.

$$y = \left(-1 - \frac{4x}{5} \right)^{-5}$$

u = $\left(-1 - \frac{4x}{5} \right)$

(Type an expression using x as the variable.)

y = u^{-5}

(Type an expression using u as the variable.)

$$\frac{dy}{dx} = 4 \left(-1 - \frac{4x}{5} \right)^{-6}$$

(Type an expression using x as the variable.)

7.
Write the function below in the form y = f(u) and u = g(x), then find $\frac{dy}{dx}$ as a function of x.

$$y = \sin (\csc x)$$

What are the functions f(u) and g(x)?

f(u) = $\sin (u)$

g(x) = $\csc x$

Determine $\frac{dy}{dx}$.

$$\frac{dy}{dx} = -\cos (\csc x) \csc x \cot x$$

8.
Write the function in the form y = f(u) and u = g(x). Then find $\frac{dy}{dx}$ as a function of x.

$$y = \cot^7 x$$

u = $\cot x$

(Type an expression using x as the variable.)

y = u^7

(Type an expression using u as the variable.)

$$\frac{dy}{dx} = -7 \cot^6 x \csc^2 x$$

(Type an expression using x as the variable.)

9.   Find the derivative of the function $y = \sqrt{-7 + 3x}$.

$$\frac{dy}{dx} = \frac{3}{2\sqrt{-7 + 3x}}$$

10. Find the derivative of the given function.

$$y = x^2 \sin^5 x + x \cos^{-4} x$$

$$\frac{dy}{dx} = 2x \sin^5 x + 5x^2 \cos x \sin^4 x + \cos^{-4} x + 4x \sin x \cos^{-5} x$$

11. Find the derivative of the function $y = (4x + 3)^4 (2x + 1)^{-3}$.

$$\frac{dy}{dx} = \frac{(4x + 3)^3 (8x - 2)}{(2x + 1)^4}$$

12. Find the derivative of the function below.

$$h(x) = x \cot\left(6\sqrt{x}\right) + 2$$

$$\frac{dh}{dx} = -3\sqrt{x} \csc^2\left(6\sqrt{x}\right) + \cot\left(6\sqrt{x}\right)$$

13. Find the derivative of the function below.

$$r = \sin\left(\theta^4\right) \cos(2\theta)$$

$$\frac{dr}{d\theta} = 4\theta^3 \cos(2\theta) \cos\left(\theta^4\right) - 2 \sin\left(\theta^4\right) \sin(2\theta)$$

14. Find $\frac{dy}{dt}$ for $y = \cos^2(8\pi t - 5)$.

$$\frac{dy}{dt} = -16\pi \cos(8\pi t - 5) \sin(8\pi t - 5)$$

15. Find $\frac{dy}{dt}$.

$$y = (1 + \cot 4t)^{-6}$$

$$\frac{dy}{dt} = \frac{24 \csc^2 4t}{(1 + \cot 4t)^7}$$

16. Find $\frac{dy}{dt}$.

$$y = \cos(\tan(7t - 6))$$

$$\frac{dy}{dt} = -7 \sin(\tan(7t - 6)) \sec^2(7t - 6)$$

17. Find y''.

$y = \dfrac{1}{9} \cot (3x - 5)$

$y'' = \boxed{2 \csc^2 (3x - 5) \cot (3x - 5)}$