Student: Cole Lamers **Date:** 10/19/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 7.2 Natural Logarithms

1. Express **ln** $\frac{1}{9}$ in terms of **ln** 2 and / or **ln** 3.

ln $\frac{1}{9}$ in terms of **ln** 2 and / or **ln** 3 is $0 \ln 2 - 2 \ln 3$.

(Type an exact answer.)

2. Use the properties of logarithms to simplify the expression **ln** (**cos** θ) − **ln** $\left(\dfrac{\cos \theta}{6} \right)$.

ln (**cos** θ) − **ln** $\left(\dfrac{\cos \theta}{6} \right)$ =   **ln** 6

(Type an exact answer.)

3. Find the derivative of y with respect to x of y = 6**ln**(5x).

The derivative of y with respect to x of y = 6**ln**(5x) is $\dfrac{6}{x}$.

4. Find the derivative of y with respect to t.

   y = **ln** $\left(t^{10} \right)$

$\dfrac{dy}{dt}$ = $\dfrac{10}{t}$

5. Find the derivative of y with respect to x of y = **ln** $\left(\dfrac{15}{x} \right)$.

The derivative of y with respect to x of y = **ln** $\left(\dfrac{15}{x} \right)$ is $-\dfrac{1}{x}$.

6. Find the derivative of y with respect to θ.

   y = **ln** (θ − 3)

$\dfrac{dy}{d\theta}$ = $\dfrac{1}{\theta - 3}$

7. Find the derivative of y with respect to x of y = **ln** $\left(x^{6} \right)$.

The derivative of y with respect to x of y = **ln** $\left(x^{6} \right)$ is $\dfrac{6}{x^{1}}$.

8. Find the derivative of y with respect to t.

    $y = t(\ln 3t)^2$

    $\dfrac{dy}{dt} = \boxed{\ln^2 (3t) + 2 \ln (3t)}$

9. Find the derivative of y with respect to x of $y = \dfrac{\ln(4x)}{4x}$.

    The derivative of y with respect to x of $y = \dfrac{\ln(4x)}{4x}$ is $\boxed{\dfrac{1 - \ln (4x)}{4x^2}}$.

10. Find the derivative of y with respect to x.

    $y = \dfrac{\ln x}{5 + \ln x}$

    $\dfrac{dy}{dx} = \boxed{\dfrac{5}{x(5 + \ln (x))^2}}$

11. Find the derivative of y with respect to θ of $y = 5\theta(\sin (\ln (5\theta)) + \cos (\ln (5\theta)))$.

    The derivative of y with respect to θ of $y = 5\theta(\sin (\ln (5\theta)) + \cos (\ln (5\theta)))$ is $\boxed{10 \cos (\ln (5\theta))}$.

12. Find the derivative of y with respect to x.

    $y = \ln \left(\dfrac{1}{x\sqrt{x - 6}} \right)$

    $\dfrac{dy}{dx} = \boxed{- \dfrac{3x - 12}{2x(x - 6)}}$

13. Evaluate the integral $\displaystyle\int_{-11}^{-8} \dfrac{dx}{x}$.

    $\displaystyle\int_{-11}^{-8} \dfrac{dx}{x} = \boxed{\ln 8 - \ln 11}$

14. Evaluate the integral $\displaystyle\int \dfrac{5y^4 dy}{y^5 - 2}$.

    $\displaystyle\int \dfrac{5y^4 dy}{y^5 - 2} = \boxed{\ln |y^5 - 2| + C}$

    (Use C as an arbitrary constant.)

15. Evaluate the integral $\displaystyle\int_{0}^{\pi/6} \frac{6\,\sin\,(6t)}{5-\cos\,(6t)}\,dt$.

$\displaystyle\int_{0}^{\pi/6} \frac{6\,\sin\,(6t)}{5-\cos\,(6t)}\,dt =$ $\boxed{\ln 6 - \ln 4}$

---

16. Evaluate the integral.

$$\int_{1}^{11} \frac{4(\ln\,x)^3}{x}\,dx$$

$\displaystyle\int_{1}^{11} \frac{4(\ln\,x)^3}{x}\,dx =$ $\boxed{(\ln 11)^4}$ (Type an exact answer.)

---

17. Evaluate the integral $\displaystyle\int_{10}^{100} \frac{dx}{x(\ln x)^{10}}$.

$\displaystyle\int_{10}^{100} \frac{dx}{x(\ln x)^{10}} = \boxed{\frac{1}{9(\ln 10)^9} - \frac{1}{9(\ln 100)^9}}$

---

18. Evaluate the integral $\displaystyle\int \frac{6\,\sec^2(2t)}{7+3\,\tan(2t)}\,dt$.

$\displaystyle\int \frac{6\,\sec^2(2t)}{7+3\,\tan(2t)}\,dt =$ $\boxed{\ln\left|3\,\tan\,(2t)+7\right|+C}$

(Use C as the arbitrary constant.)