Math 3 Name _____

Inverse Test Review Date_____ Per_____

Find a formula for $f^{-1}(x)$. Give the domain of $f^{-1}(x)$, including any restrictions "inherited" from f.

1. $f(x) = \frac{5x}{x-8}$

D: $(-\infty, 8) \cup (8, \infty)$

$x = \frac{5y}{y-8}$

$x(y-8) = 5y$

$xy - 8x = 5y$

$-8x = 5y - xy$

$-8x = y(5-x)$

$f^{-1}(x) = \frac{-8x}{5-x}$

D: $(-\infty, 5) \cup (5, 8) \cup (8, \infty)$

Expand each logarithm. Rewrite each expression as a sum, difference, or product of logs.

2. $\log \frac{2xy}{z}$

$\log 2 + \log x + \log y - \log z$

3. $\log (3xyz^2)^3$

$3\log(3xyz^2)$

$3[\log 3 + \log x + \log y + 2\log z]$

$3\log_3 3 + 3\log x + 3\log y + 6\log z$

4. $\ln \frac{3y}{\sqrt[4]{x}}$

$\ln 3y - \ln x^{\frac{1}{4}}$

$\ln 3 + \ln y - \frac{1}{4}\ln x$

For the following exercises, condense each expression to a single logarithm using the properties of logarithms.

5. $\ln x - \ln y + \ln z + \ln 3$

$\ln \frac{3xz}{y}$

6. $3[\ln(x-2) + 2\ln(x+1) - 5\ln(x-1)]$

$3[\ln(x-2) + \ln(x+1)^2 - \ln(x-1)^5]$

$\ln(x-2)^3 + \ln(x+1)^6 - \ln(x-1)^{15}$

$\ln \frac{(x-2)^3(x+1)^6}{(x-1)^{15}}$

Find the exact solution to the equation.

7. $\log_{10}(x-3) = -1$

$10^{-1} = x-3$

$\frac{1}{10} = x-3$

$x = 3\frac{1}{10} = \frac{31}{10} = 3.1$

8. $9\ln(x-5) = 1$

$\ln(x-5) = \frac{1}{9}$

$e^{\frac{1}{9}} = x-5$

$x = e^{1/5} + 5$

9. $9^{7x} = 81$

$9^{7x} = 9^2$

$7x = 2$

$x = \frac{2}{7}$

10. $100\left(\frac{1}{5}\right)^{\frac{x}{2}} = 4$

$\left(\frac{1}{5}\right)^{\frac{x}{2}} = \frac{1}{25}$

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

$\frac{x}{2} = 2$

$x = 4$

Solve the equation.

11. $\log 2x = \log 5 + \log(x-2)$

$\log 2x = \log 5(x-2)$

$2x = 5x-10$

$-3x = -10$

$x = \frac{10}{3}$

12. $\log(4+x) - \log(x-3) = \log 4$

$\log \frac{4+x}{x-3} = 4$

$(x-3)\left(\frac{4+x}{x-3}\right) = (4)(x-3)$

$4+x = 4(x-3)$

$4+x = 4x-12$

$4 = 3x-12$

$16 = 3x$

$x = \frac{16}{3}$

Find an approximate solution to the equation. Round to 3 Decimal places.

13. $2^x = 17$

$\ln 2^x = \ln 17$

$x \ln 2 = \ln 17$

$x = \frac{\ln 17}{\ln 2}$

$= 4.087$

14. $e^{-0.15t} = 0.22$

$\ln e^{-.15t} = \ln .22$

$-.15t = \ln .22$

$t = \frac{\ln .22}{-.15}$

$= 10.094$

15. $6\ln(x + 2.8) = 9.6$

$\ln(x+2.8) = 1.6$

$e^{1.6} = x + 2.8$

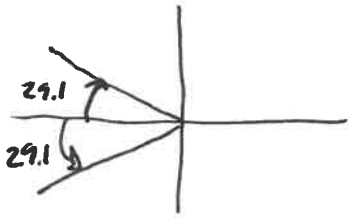
$e^{1.6} - 2.8 = x$

$x = 2.153$

Use your calculator to solve the equation between $0 \le \theta < 360$. Round your answers to the nearest tenth. You should have 2 answers.

$\cos^{-1}(-.874)$

16. $\cos\theta = -0.874 = 150.9$



$180 + 29.1 = 209.1$

17. $\sin\theta = 0.621$

$\sin^{-1}(.621) = 38.4°$

$180 - 38.4 = 141.6°$

Math 3 Name _____

Inverse Test Non – Calculator Review Date_____ Per_____

Evaluate the logarithm

1. $\log_4 256$

$4^y = 256$

4

2. $\log_6 \left(\frac{1}{36}\right)$

$6^x = \frac{1}{36}$

$= -2$

3. $\log_7 7^8$

8

Find the **exact value** of the function.

4. $\cos \frac{17\pi}{6} = \cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$

$\frac{17\pi}{6} - \frac{12\pi}{6}$

5. $\tan 690° = \tan 330° = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}}$

690
-360
330

6. $\sin 630° = \sin 270° = -1$

630
-360
270

7. $\sin(-150)° = \sin 210 = -\frac{1}{2}$

8. $\cos \frac{-5\pi}{4} = \cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$

9. $\tan -\frac{3\pi}{2} = \tan \frac{\pi}{2} = \text{undefined}$

Find the exact value of the expression in **radians and degrees.**

10. $\sin^{-1}\left(\frac{1}{2}\right) = 30° \quad \frac{\pi}{6}$

11. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) = 150°, \quad \frac{5\pi}{6}$

12. $\tan^{-1}(-\sqrt{3})$

$-60°, \quad -\frac{\pi}{3}$

13. $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

$-60°, \quad -\frac{\pi}{3}$

Find the exact value given the following information. Give your answer in radians or degrees.

14. $\cos^{-1}\left(\tan\frac{\pi}{4}\right)$

$\cos^{-1}(1)$

0°

15. $\sin\left(\cos^{-1}-\frac{1}{2}\right)$

$\sin(120^\circ)$

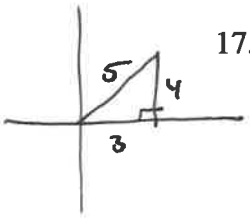
$\frac{\sqrt{3}}{2}$

16. $\sin^{-1}\left(\cos\frac{2\pi}{3}\right)$

$\sin^{-1}\left(-\frac{1}{2}\right)$

$-30^\circ, -\frac{\pi}{6}$

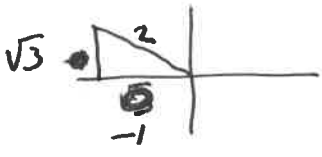
Use Pythagorean Theorem to find the exact value.



17. $\sin\left(\tan^{-1}\frac{4}{3}\right)$

$\sin\theta = \frac{4}{5}$

18. $\sin\left(\cos^{-1}\left(-\frac{1}{2}\right)\right)$



$\sin\theta = \frac{\sqrt{3}}{2}$

Solve each equation between $0 \le \theta < 360$

19. $4\sin\theta + 2 = 2$

$4\sin\theta = 0$

$\sin\theta = 0$

$0^\circ, 180^\circ$

$0, \pi$

20. $\sin 3\theta = -\frac{1}{2}$

$3\theta = 210 \pm 360k$

$\theta = 70 \pm 120k$

$70, 190, 310$

$3\theta = 330 \pm 360k$

$\theta = 110 \pm 120k$

$110, 230, 350$

21. $\sin^2\theta - 2\sin\theta + 1 = 0$

$(\sin\theta - 1)(\sin\theta - 1) = 0$

$\sin\theta = 1 \quad \sin\theta = 1$

$90^\circ, \frac{\pi}{2}$

22. $\tan^2\theta + \tan\theta = 0$

$\tan\theta(\tan\theta - 1) = 0$

$\tan\theta = 0 \quad \tan\theta - 1 = 0$

$\tan\theta = 1$

$0, 180^\circ \quad 45^\circ, 225^\circ$

23. $-3\tan\theta + 1 = 4$

$-3\tan\theta = 3$

$\tan\theta = -1$

$135^\circ, 315^\circ$

24. $4\sin^2\theta - 1 = 2$

$4\sin^2\theta = 3$

$\sin^2\theta = \frac{3}{4}$

$\sin\theta = \pm\frac{\sqrt{3}}{2}$