

Solve each equation. No Calculator for these.

1. $2^{3x} = 4$
 $2^{3x} = 2^2$
 $3x = 2$
 $x = \frac{2}{3}$

2. $e^{x^2+1} = e^{x+3}$
 $x^2+1 = x+3$
 $x^2-x-2=0$
 $(x-2)(x+1)=0$
 $x = 2, -1$

3. $8^{3x+1} = 2^{\frac{2}{x}}$
 $(2^3)^{3x+1} = 2^{\frac{2}{x}}$
 $2^{9x+3} = 2^{\frac{2}{x}}$
 $9x+3 = \frac{2}{x}$
 $9x^2+3x=2$
 $9x^2+3x-2=0$
 $(3x-1)(3x+2)=0$
 $x = \frac{1}{3}, -\frac{2}{3}$

4. $\log_3(\log_4 x) = 1$
 $3 = \log_4 x$
 $4^3 = x$
 $64 = x$

5. $\log_3(2x+3) = 2$
 $3^2 = 2x+3$
 $9 = 2x+3$
 $6 = 2x$
 $3 = x$

6. $\log_9 243 = x$
 $9^x = 243$
 $9^x = 9^3$
 $x = 3$

Solve each equation. Round your answers to three decimal places.

7. $4 + 3e^{2x} = 37$
 $3e^{2x} = 33$
 $e^{2x} = 11$
 $\ln 11 = 2x$
 $1.199 = x$

8. $3 + 2(3)^{x+2} = 11$
 $2 \cdot 3^{x+2} = 8$
 $3^{x+2} = 4$
 $\log_3 4 = x+2$
 $-0.738 = x$

9. $\log_4\left(\frac{x+1}{x}\right) = 1$
 $4^1 = \frac{x+1}{x}$
 $4x = x+1$
 $3x = 1$
 $x = \frac{1}{3}$

10. $3 + 4\log_3(5x+1) = 11$
 $4\log_3(5x+1) = 8$
 $\log_3(5x+1) = 2$
 $3^2 = 5x+1$
 $9 = 5x+1$
 $8 = 5x$
 $8/5 = x$

Simplify or evaluate.
 $4^x = 32$
 $2^{2x} = 2^5$
 11. $3\log_3 \frac{1}{9} + \frac{1}{2}\log_4 32$
 $3 \cdot (-2) + \frac{1}{2} \left(\frac{5}{2}\right)$
 $-6 + \frac{5}{4}$
 $-\frac{19}{4}$

$8^x = 2^{-5}$
 $2^{3x} = 2^{-5}$
 12. $4\log_8 \frac{1}{32} + \frac{1}{3}\log_4 64$
 $4 \left(-\frac{5}{3}\right) + \frac{1}{3} \cdot 3$
 $-\frac{20}{3} + 1$
 $-\frac{17}{3}$

13. $(\log_2 16)(\log_3 27)(\log_4 8)$
 $4^x = 8$
 $2^{2x} = 2^3$
 $4 \cdot 3 \cdot \left(\frac{3}{2}\right)$
 18

Find the inverse equation $f^{-1}(x)$ for each function.

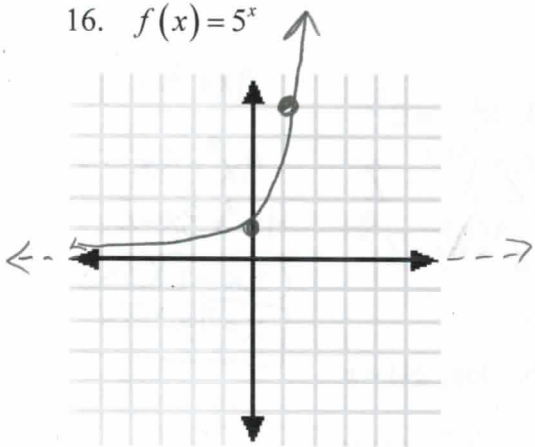
14. $f(x) = 2 + 3^{x+1}$
 $x = 2 + 3^{y+1}$
 $x-2 = 3^{y+1}$
 $\log_3(x-2) = y+1$
 $\log_3(x-2) - 1 = f^{-1}(x)$

15. $f(x) = 3 - \log_2(x-1)$
 $x = 3 - \log_2(y-1)$
 $x-3 = -\log_2(y-1)$
 $-x+3 = \log_2(y-1)$
 $2^{-x+3} = y-1$

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

Graph each function. Be sure to identify the domain, range, equation of asymptote, and coordinates of the intercept of the function.

16. $f(x) = 5^x$



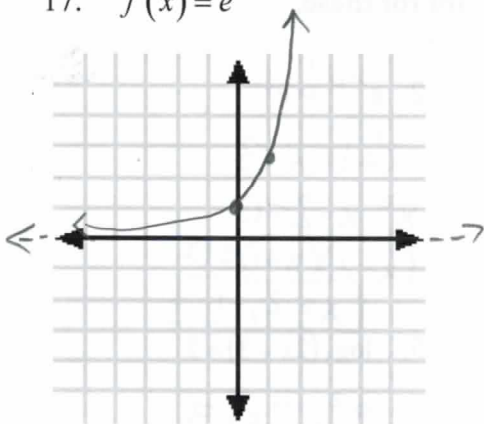
Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Asymptote: $y = 0$

Intercept: $(0, 1)$

17. $f(x) = e^x$



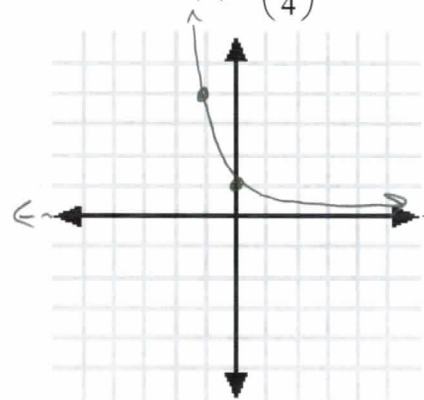
Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Asymptote: $y = 0$

Intercept: $(0, 1)$

18. $f(x) = \left(\frac{1}{4}\right)^x$



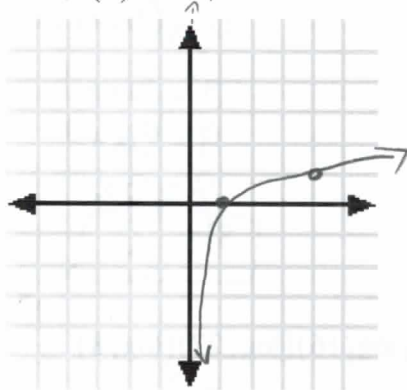
Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Asymptote: $y = 0$

Intercept: $(0, 1)$

19. $f(x) = \log_4 x$



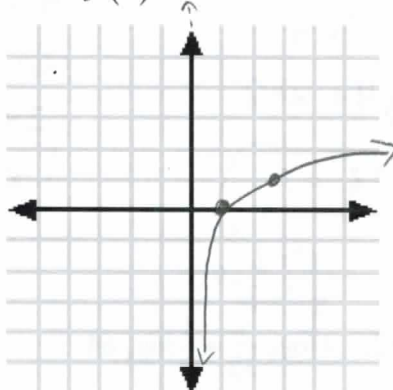
Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

Asymptote: $x = 0$

Intercept: $(1, 0)$

20. $f(x) = \ln x$



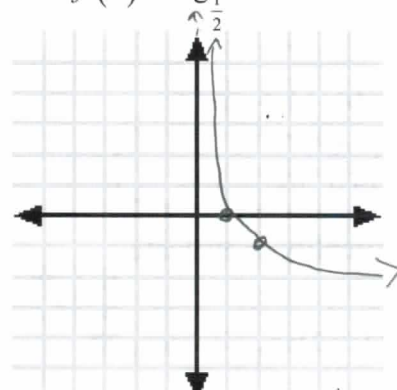
Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

Asymptote: $x = 0$

Intercept: $(1, 0)$

21. $f(x) = \log_{\frac{1}{2}} x$



Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

Asymptote: $x = 0$

Intercept: $(1, 0)$