Precalculus
Unit 3 Review B

Name Key
Period_____ Date_____

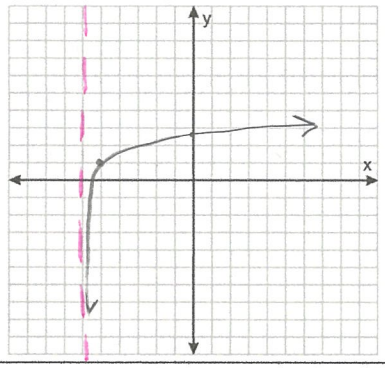
Graph. Find the domain, range, x-intercept(s), y-intercept and asymptotes of the function.

1. $f(x) = 1 + \ln(x+6)$ up 1 left 6

Domain: $(-7, \infty)$

Range: $\mathbb{R}$

VA: $x = -7$

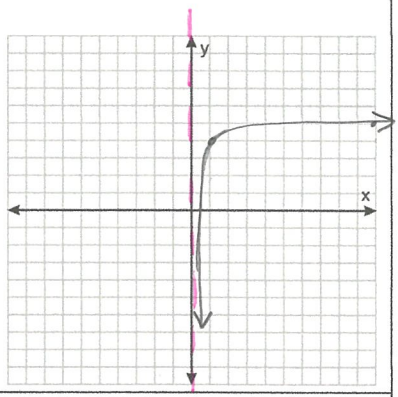


2. $f(x) = \log x + 4$ up 4

Domain: $(0, \infty)$

Range: $\mathbb{R}$

VA: $x = 0$

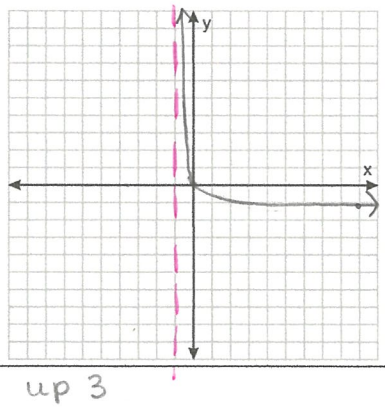


3. $f(x) = -\log(x+1)$ reflect x-axis Left 1

Domain: $(-1, \infty)$

Range: $\mathbb{R}$

VA: $x = -1$

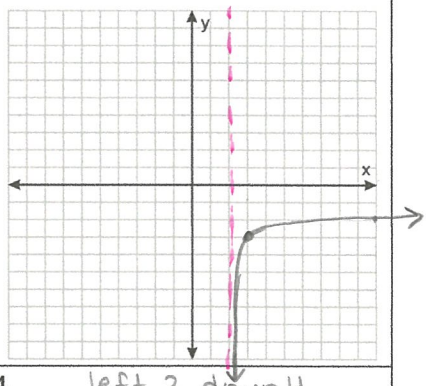


4. $f(x) = \log(x-2) - 3$ right 2 down 3

Domain: $(2, \infty)$

Range: $\mathbb{R}$

VA: $x = 2$

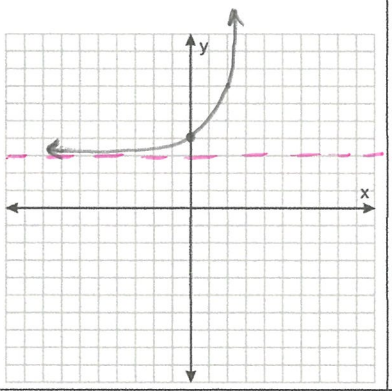


5. $f(x) = 2^x + 3$ up 3

Domain: $\mathbb{R}$

Range: $(3, \infty)$

HA: $y = 3$

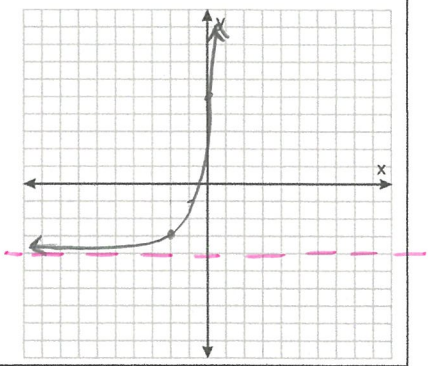


6. $f(x) = 3^{x+2} - 4$ left 2 down 4

Domain: $\mathbb{R}$

Range: $(-4, \infty)$

HA: $y = -4$

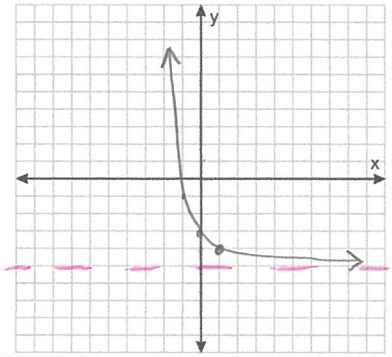


7. $f(x) = 2^{1-x} - 5$ reflect y-axis Right 1 down 5

Domain: $\mathbb{R}$

Range: $(-5, \infty)$

HA: $y = -5$

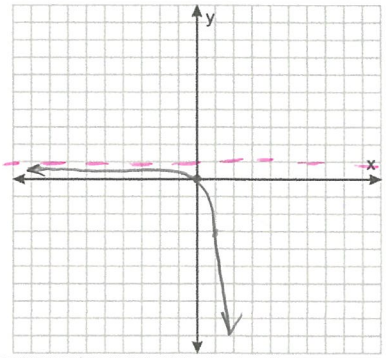


8. $f(x) = -4^x + 1$ reflect x-axis up 1

Domain: $\mathbb{R}$

Range: $(-\infty, 1)$

HA: $y = 1$



Write in exponential form.

9. $\log_3 x = 2$ $3^2 = x$	10. $\log_x 16 = 4$ $x^4 = 16$
11. $\log_4 64 = x$ $4^x = 64$	12. $\log_x 25 = 2$ $x^2 = 25$

Write in logarithmic form.

13. $9^2 = 81$ $\log_9 81 = 2$	14. $a^{-1} = \frac{1}{a}$ $\log_a (1/a) = -1$
15. $3^{-3} = \frac{1}{27}$ $\log_3 (1/27) = -3$	16. $5^3 = 125$ $\log_5 125 = 3$

State the domain and range.

17. $f(x) = 2 + 3^{-x}$ D: $\mathbb{R}$ R: $(2, \infty)$	18. $f(x) = 5^x - 2$ D: $\mathbb{R}$ R: $(-2, \infty)$
19. $f(x) = \log x + 2$ D: $(0, \infty)$ R: $\mathbb{R}$	20. $f(x) = -\log(x+3) - 1$ D: $(-3, \infty)$ R: $\mathbb{R}$

Simplify using change of base.

21. $\log_3 15$ $\frac{\log 15}{\log 3} \approx 2.46$	22. $\log_m N$ $\frac{\log N}{\log m}$
23. $\log_2 6$ $\frac{\log 6}{\log 2} \approx 2.58$	24. $\log_b A$ $\frac{\log A}{\log b}$

Evaluate.

25. $\ln(\sqrt{5} - 2) \approx -1.44$	26. $\log 5 \approx .6989$

What is the initial value?

27. $f(x) = \frac{300}{5+5(2)^{-4x}}$ Let $x=0$ $f(x) = \frac{300}{5+5(2)^{-4(0)}} = 30$	28. $y = 152 \cdot 2^{x-1}$ Let $x=0$ $y = 152 \cdot 2^{0-1} = 76$

Condense	Expand
29. $3\log_3 x + \frac{1}{4}\log_3 y - 4\log_3 z$ $\log_3 \frac{x^3\sqrt[4]{y}}{z^4}$	32. $\ln\frac{3}{\sqrt{x^2+1}}$ $\ln 3 - \frac{1}{2}\ln(x^2+1)$
30. $4[\ln z + \ln(z+5)] - 2\ln(z-5)$ $\ln \frac{z^4(z+5)^4}{(z-5)^2}$	33. $\log_2 x^4\sqrt{\frac{y}{z^3}}$ $4\log_2 x + \frac{1}{2}\log_2 y - \frac{3}{2}\log_2 z$
31. $2\ln 8 - 5\ln(z-4)$ $\ln \frac{64}{(z-4)^5}$	34. $\log\frac{w^2}{vy}$ $2\log w - \log v - \log y$

35. \$600 is invested at a rate of 4% compounded monthly. What is the balance after 10 years?

$$A = P\left(1+\frac{r}{k}\right)^{kt}$$

$A = 600\left(1+\frac{.04}{12}\right)^{12(10)}$

$A = \$894.49$

36. Find the time to triple an initial investment of \$1000 compounded continuously at an interest rate of 4.8%.

$$A = Pe^{rt}$$

$3 = e^{rt}$

$3 = e^{.048t}$

$\ln 3 = .048t$

$t = \frac{\ln 3}{.048} \approx 22.88$ yrs

37. Find the initial quantity of ^{239}Pu with a half-life of 24,100 years if the amount is 0.4 grams after 1000 years.

$$P(t) = P\left(\frac{1}{2}\right)^{t/h}$$

$0.4 = P\left(\frac{1}{2}\right)^{\frac{1000}{24,100}}$

$0.4 \approx .97P$

$P \approx .411$ grams

Solve for x.

38. $4^{2x} = \left(\frac{1}{4}\right)^{x+2}$ $4^{2x} = 4^{-1(x+2)}$ $2x = -x - 2$ $3x = -2$ $x = -2/3$	39. $32^{3x} = 16^{x-3}$ $2^{5(3x)} = 2^{4(x-3)}$ $15x = 4x - 12$ $11x = -12$ $x = \frac{-12}{11}$
40. $\log_x 64 = -3$ $x^{-3} = 64$ $x = \frac{1}{4}$ $4^3 = 64$ $\left(\frac{1}{4}\right)^{-3} = 64$	41. $\log(3x+1) + \log(x-2) = 1$ $\log(3x+1)(x-2) = 1$ $\log(3x^2 - 5x - 2) = 1$ $10^1 = 3x^2 - 5x - 2$ $0 = 3x^2 - 5x - 12$ $0 = (3x+4)(x-3)$ $x = \cancel{-4/3}, 3$
42. $e^{x^2+4x} = e^5$ $x^2 + 4x = 5$ $x^2 + 4x - 5 = 0$ $(x+5)(x-1) = 0$ $x = -5, 1$	43. $\log(x+1) + \log(x-3) = \log 5$ $\log(x+1)(x-3) = \log 5$ $\log(x^2 - 2x - 3) = \log 5$ $x^2 - 2x - 3 = 5$ $x^2 - 2x - 8 = 0$ $(x-4)(x+2) = 0$ $x = 4, \cancel{-2}$
44. $\ln(x-1) - \ln(2x-5) = \ln 3$ $\ln \frac{(x-1)}{(2x-5)} = \ln 3$ $\frac{x-1}{2x-5} = \frac{3}{1}$ $x - 1 = 6x - 15$ $14 = 5x$ $x = 14/5$	45. $\log(3x+4) - \log(x-7) = 1$ $\log \frac{(3x+4)}{(x-7)} = 1$ $10^1 = \frac{3x+4}{x-7}$ $10x - 70 = 3x + 4$ $7x = 74$ $x = 74/7$