Polynomial Review:

The number of roots is the same as the ① degree of the polynomia l.

To find the roots, use your calculator to find any real roots, then use Synthetic division to take it to a quadratic function so you can use quadratic formula to get the other roots.

e is an irrational ③ number like pi. ln is log with a base of e.

4 Find $P(-3)$ if $P(x) = -2x^3 + x^2 - 1$

$-2(-3)^3 + (-3)^2 - 1$

$-2(-27) + 9 - 1$

$54 + 9 - 1$

63

5 Find a polynomial of degree 3 with roots $3, i, -i$

$(x-3)(x-i)(x+i)$

$x^2 - x^2$

$(x-3)(x^2+1)$

$x^3 - 3x^2 + x - 3$

6 Find all roots of $2x^4 - 7x^3 + 5x^2 + 9x - 5$

$-1 \mid 2 \;\; -7 \;\; 5 \;\; 9 \;\; -5$

$\downarrow \;\; -2 \;\; 9 \;\; -14 \;\; 5$

$2 \;\; -9 \;\; 14 \;\; -5 \;\; 0$

$-1, \frac{1}{2}, 2+i$

$\frac{1}{2} \mid 2 \;\; -9 \;\; 14 \;\; -5$

$\downarrow \;\; 1 \;\; -4 \;\; 5$

$2 \;\; -8 \;\; 10 \;\; 0$

$2x^2 - 8x + 10$

Divide using synthetic division:

7 $(4x^4 - 9x^3 - 7x^2 - 6x + 1) \div (x+1)$

$-1 \mid 4 \;\; -9 \;\; -7 \;\; -6 \;\; 1$

$\downarrow \;\; -4 \;\; 13 \;\; -6 \;\; 12$

$4 \;\; -13 \;\; 6 \;\; -12 \;\; 13$

$4x^3 - 13x^2 + 6x - 12 + \frac{13}{x+1}$

8 $(x^4 - 1) \div (x-1)$

$1 \mid 1 \;\; 0 \;\; 0 \;\; 0 \;\; -1$

$\downarrow \;\; 1 \;\; 1 \;\; 1 \;\; 1$

$1 \;\; 1 \;\; 1 \;\; 1 \;\; 0$

$x^3 + x^2 + x + 1$

Logarithms and Exponential functions are inverses ② of each other.

To solve.....log on one side of equation: around the world

Always condense a log before solving to write it as a single log.

Ln undoes e

$\frac{8 \pm \sqrt{64-4(}}{4}$

$\frac{8 \pm \sqrt{-16}}{4}$

$\frac{8 \pm 4i}{4}$

$2 \pm i$

Write each logarithmic equation in its equivalent exponential form:

9. $\log_4 64 = 3$

$4^3 = 64$

10. $\log \frac{1}{100} = -2$

understood to be base 10 $\quad 10^{-2} = \frac{1}{100}$

Write each exponential equation in its equivalent logarithmic form:

11. $10^{-4} = 0.0001$

$\log_{10} .0001 = -4$

12. $\sqrt[3]{512} = 8$

$512^{\frac{1}{3}} = 8$

$\log_{512} 8 = \frac{1}{3}$

Evaluate:

13. $\log_7 1$

$\frac{\log 1}{\log 7} = 0$

14. $\log 10^{12}$

$\frac{\log 10^{12}}{\log 10}$ $\quad 12$

Write each expression as a sum or difference of logarithms:

19. $\text{Log}_3 x^2 y^{-3}$

$2\log_3 x - 3\log_3 y$

20. $\log x^6 \sqrt{x+5}$

$\log x + \frac{1}{6}\log(x+5)$

$\log = \log$

Solve the exponential equations exactly for x:

21. $3^{x^2} = 81$

$x^2 = 4$

$x = \pm 2$

22. $e^{\sqrt{x}} = e^{4.8}$

$\sqrt{x} = 4.8$

23.04

Solve the exponential equation. Round your answer to three decimal places:

23. $2^{2x-1} + 3 = 17$

$-3 \quad -3$

$2^{2x-1} = 14$

$\frac{(2x-1)\log(2)}{\log 2} = \frac{\log 14}{\log 2}$ $\quad 2.404$

24. $\frac{4e^{0.1x}}{4} = \frac{64}{4}$

$e^{.1x} = 16$

$.1x = \ln 16$ $\quad 27.726$

Solve the logarithmic equations

25. $\text{Log}_3(x+2) = 4$

$3^4 = x+2$

$81 = x+2$

$x = 79$

26. $\text{Ln}(3x-4) = 7$

$3x - 4 = e^7$ $\quad 366.8778$

27. $e^{3x} = 4$

$2x = \ln 4$ $\quad .462$

28. $\text{Log } 3 + \log 4x - \log 5 = 2$

$\log \frac{12x}{5} = 2$

$10^2 = \frac{12x}{5}$ $\quad 41.6$

29 14. Find the range of the equation $y = \sqrt{x-2}+5$

2, 5 is Key

$[5, \infty)$

30 15. Find the domain of the equation $y = \frac{2x}{\sqrt{x-4}}$

cannot be zero

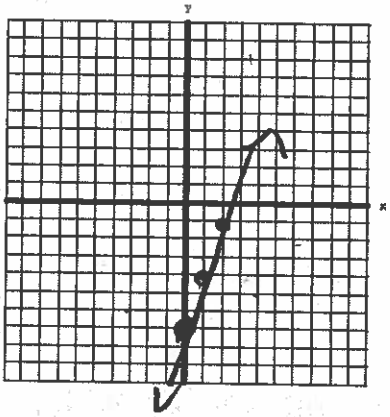
$(4, \infty)$

31 16. Graph the equation: $3x - y = 7$

$y = 3x - 7$

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

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



$(-5, 3)$ Key pt

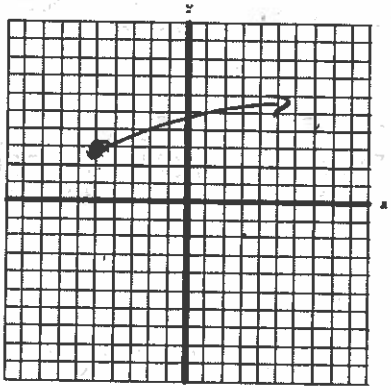
32 17. Graph the equation: $y = \sqrt{x+5}+3$

Domain: $[-5, \infty)$

Range: $[3, \infty)$

Parent Function: $y = \sqrt{x}$

Translation of Parent Function: left 5 up 3



33 18. Graph the equation: $y = \frac{1}{x+4}+2$

Domain: all R except -4

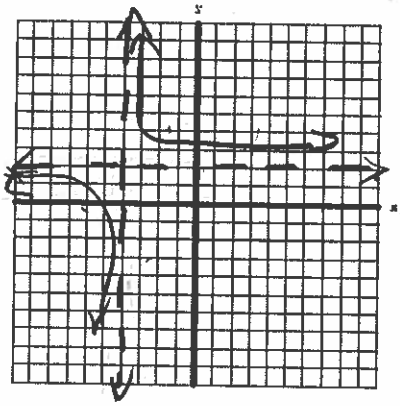
Range: all R except 2

Horizontal Asymptote: $y = 2$

Vertical Asymptote: $x = -4$

Parent Function: $y = \frac{1}{x}$

Translation of the Parent Function: left 4 up 2



34

Error Analysis A student listed the asymptotes of the function $y = \frac{x^2 - 3x + 2}{x^2 + 6x + 5}$ as shown at the right. Explain the student's error. What are the correct asymptotes?

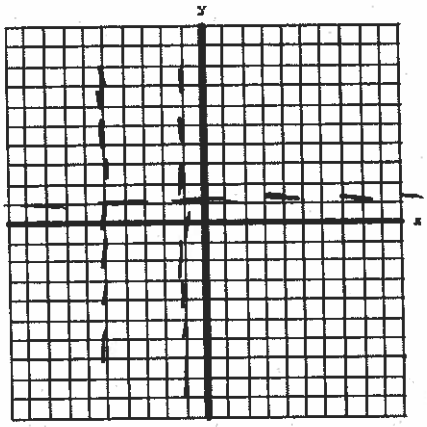
$\frac{(x-2)(x-1)}{(x+5)(x+1)}$

Vertical asymptotes: $x = 1, x = 2$

Horizontal asymptotes: $y = -1, y = -5$

$x = 1, x = -5$

$y = 1$



SKETCH the correct graph and state the asymptotes and holes.

VA $x = -1$ $x = -5$

No holes

HA $y = 1$

35 21. Write the equation of the line that passes through the point (1,-6) and is perpendicular to the line $y = 3x + 7$

$y = -\frac{1}{3}x + b$

$-6 = -\frac{1}{3} + b$

$+\frac{1}{3}$

$y = -\frac{1}{3}x - \frac{17}{3}$

36 22. Write the equation of the line that passes through the point (3,9) and is parallel to the line $y = 5x - 15$

$y = 5x + b$

$9 = 15 + b$

$y = 5x - 6$

37 23. Write the equation of the line containing the points (-5,9) and (-4,7)

$\frac{9-7}{-5+4} = \frac{2}{-1} = -2$

$y = -2x + b$

$7 = 8 + b$

$b = -1$

$y = -2x - 1$