

To graph a rational function $R(x) = \frac{p(x)}{q(x)}$

Forms:

General: $R(x) = \frac{a_n x^n + \dots + a_1 x + a_0}{b_m x^m + \dots + b_0}$

Factored: $R(x) = a \frac{(x-r_1)(x-r_2)\dots}{(x-s_1)(x-s_2)\dots}$

Domain: set <i>Denominator</i> $\neq 0$ and solve							
Reduce R to lowest terms (find common factors and remove)							
Vertical asymptotes: solve <i>Denominator</i> $= 0$ (after reducing to lowest terms)							
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$							
Details:							
<table border="1"> <tr> <td>$n < m$</td> <td>Horizontal asymptote $y = 0$</td> </tr> <tr> <td>$n = m$</td> <td>Horizontal asymptote $y = \frac{a_n}{b_m}$</td> </tr> <tr> <td>$n > m$</td> <td>Like the power function $\frac{a_n}{b_m} x^{n-m}$</td> </tr> </table>	$n < m$	Horizontal asymptote $y = 0$	$n = m$	Horizontal asymptote $y = \frac{a_n}{b_m}$	$n > m$	Like the power function $\frac{a_n}{b_m} x^{n-m}$	
$n < m$	Horizontal asymptote $y = 0$						
$n = m$	Horizontal asymptote $y = \frac{a_n}{b_m}$						
$n > m$	Like the power function $\frac{a_n}{b_m} x^{n-m}$						
Intercepts: Y-intercept: evaluate $R(0)$ X-intercept(s): solve <i>numerator</i> $= 0$ after R is reduced to lowest terms							
Graphing utility (if convenient)							
Sketch by hand using all the information							

METHODS WE ARE NOT COVERING IN THIS CLASS:

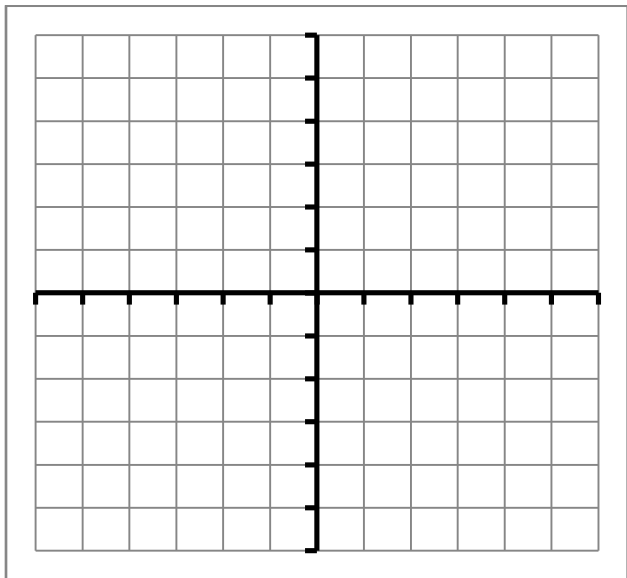
- Finding oblique asymptotes precisely (but we ARE determining end behavior)
- Finding intersections of the graph with horizontal asymptotes other than the line $y = 0$

P. 356 #10 Graph: $R(x) = \frac{2x+4}{x-1}$

General form: $R(x) = \frac{2x+4}{x-1}$

Factored form: $R(x) = 2 \frac{(x+2)}{(x-1)}$

Domain: set <i>Denominator</i> $\neq 0$ and solve	
Reduce R to lowest terms (find common factors and remove)	
Vertical asymptotes: solve <i>Denominator</i> $\neq 0$ (after reducing to lowest terms)	
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$	
Intercepts	
Graphing utility (if convenient)	
Sketch by hand using all the information	

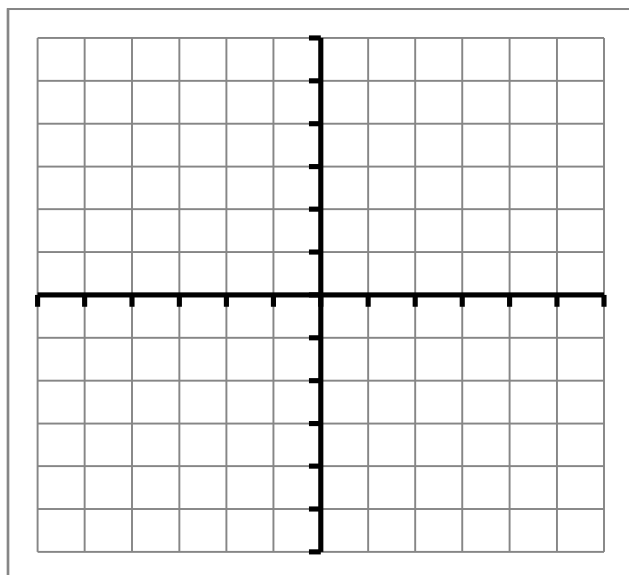


P. 356 #8 Graph: $R(x) = \frac{x}{(x-1)(x+2)}$

General: $R(x) =$

Factored: $R(x) =$

Domain: set <i>Denominator</i> $\neq 0$ and solve	
Reduce R to lowest terms (find common factors and remove)	
Vertical asymptotes: solve <i>Denominator</i> $\neq 0$ (after reducing to lowest terms)	
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$	
Intercepts	
Graphing utility (if convenient)	
Sketch by hand using all the information	



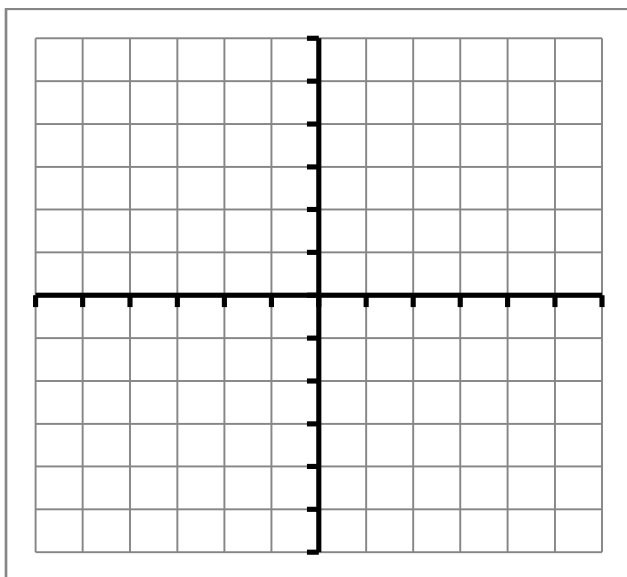
P. 356 #14 Graph: $R(x) = \frac{x^4-1}{x^2-4}$

Forms:

General: $R(x) =$

Factored: $R(x) =$

Domain: set $Denom \neq 0$ and solve	
Reduce R to lowest terms (find common factors and remove)	
Vertical asymptotes: solve $Denom = 0$ (after reducing to lowest terms)	
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$	
Intercepts:	
Graphing utility (if convenient)	
Sketch by hand using all the information	



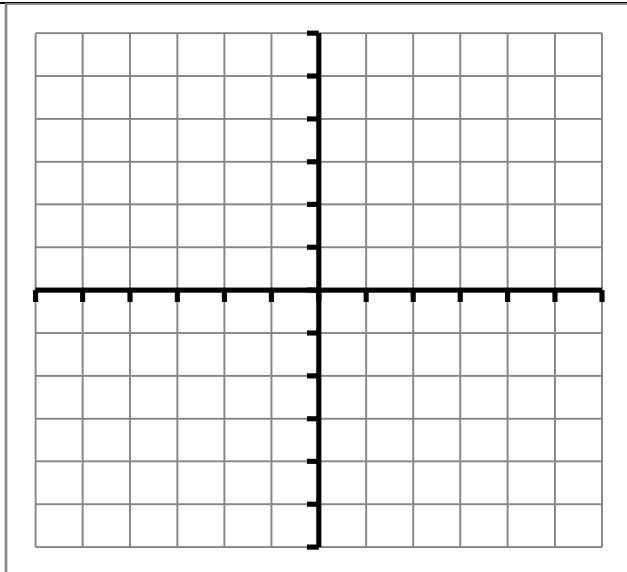
P. 356 #38 Graph: $R(x) = \frac{x^2+x-30}{x+6}$

Forms:

General: $R(x) =$

Factored: $R(x) =$

Domain: set $Denom \neq 0$ and solve	
Reduce R to lowest terms (find common factors and remove)	
Vertical asymptotes: solve $Denom = 0$ (after reducing to lowest terms)	
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$	
Intercepts:	
Graphing utility (if convenient)	
Sketch by hand using all the information	



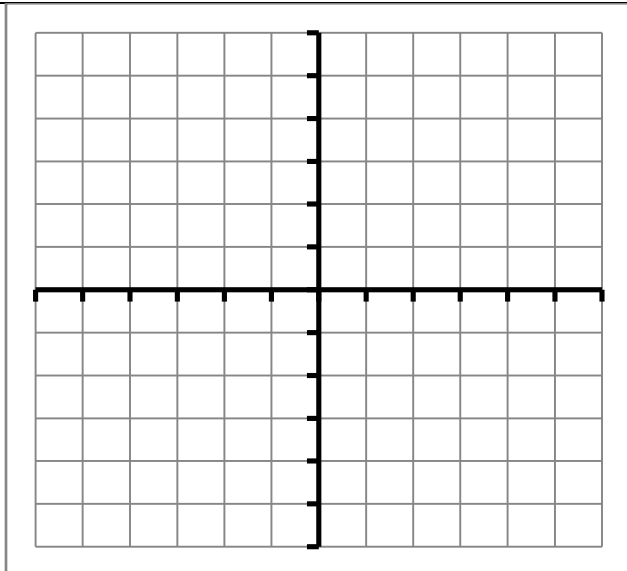
P. 356 #26 Graph: $R(x) = \frac{x^2+3x+2}{x-1}$

Forms:

General: $R(x) =$

Factored: $R(x) =$

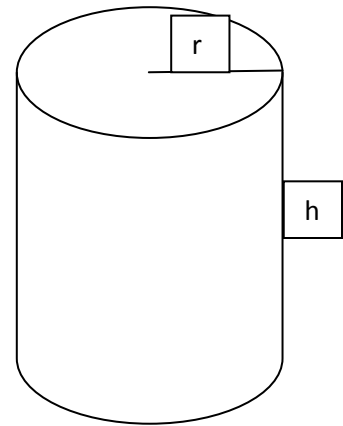
Domain: set $Denom \neq 0$ and solve	
Reduce R to lowest terms (find common factors and remove)	
Vertical asymptotes: solve $Denom = 0$ (after reducing to lowest terms)	
End behavior: examine ratio of leading terms $\frac{a_n x^n}{b_m x^m}$	
Intercepts:	
Graphing utility (if convenient)	
Sketch by hand using all the information	



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- 64. Driving to School** The time t that it takes to get to school varies inversely with your average speed s .
- (a) Suppose that it takes you 40 minutes to get to school when your average speed is 30 miles per hour. Express the driving time to school as a function of average speed.
 - (b) Suppose that your average speed to school is 40 miles per hour. How long will it take you to get to school?

62. Material Needed to Make a Drum A steel drum in the shape of a right circular cylinder is required to have a volume of 100 cubic feet.

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- (a) Express the amount A of material required to make the drum as a function of the radius r of the cylinder.
 - (b) How much material is required if the drum's radius is 3 feet?
 - (c) How much material is required if the drum's radius is 4 feet?
 - (d) How much material is required if the drum's radius is 5 feet?
 - (e) Using a graphing utility graph $A = A(r)$. For what value of r is A smallest?



P. 358 #66

The current I (amperes), voltage V (volts), and resistance R (ohms) in a circuit are related by the equation

$$V = I \cdot R$$

Assume V is held constant. If the current in a circuit is 30 amperes when the resistance is 8 ohms, then what is the current if the resistance is 10 ohms?