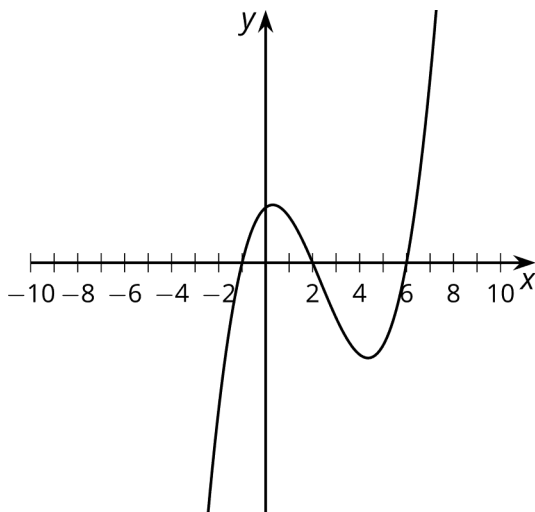


Review: Polynomial & Rational Functions

Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Mai graphs a polynomial function,  $f(x)$ , that has three linear factors  $(x + 6)$ ,  $(x + 2)$ , and  $(x - 1)$ . But she makes a mistake. What is her mistake?



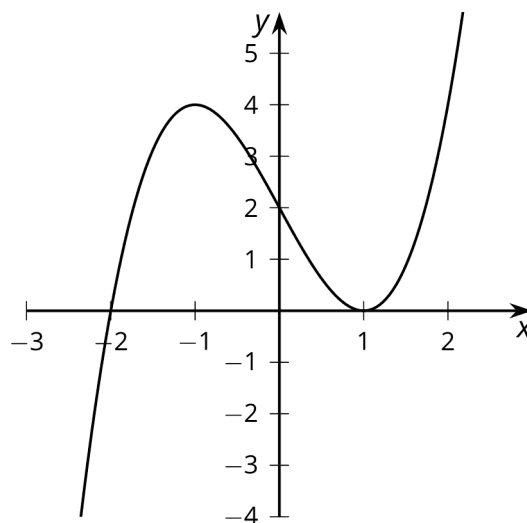
2. State the degree and end behavior of  $f(x) = -x^3 + 5x^2 + 6x + 1$ . Explain or show your reasoning.

3. Solve  $4x^3 - 10x^2 - 24x = 0$  by factoring.

- A.  $\{-\frac{3}{2}, 2, 4\}$                       B.  $\{-4, \frac{3}{2}, 2\}$   
 C.  $\{-4, 0, \frac{3}{2}\}$                       D.  $\{-\frac{3}{2}, 0, 4\}$

4. The graph of a polynomial  $f(x) = (2x - 3)(x - 4)(x + 3)$  has  $x$ -intercepts at 3  $x$  values. What are they?

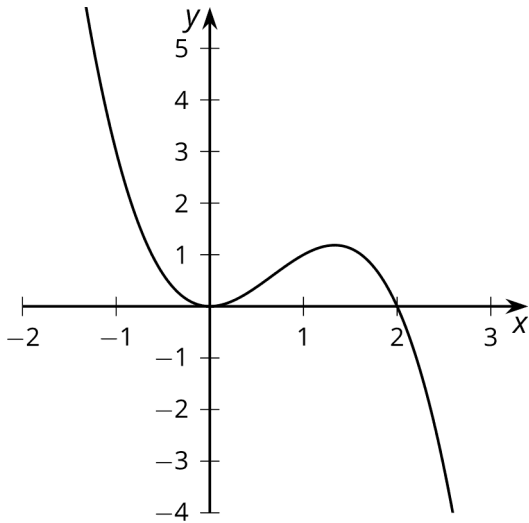
5. Is this the graph of  $g(x) = (x - 1)^2(x + 2)$  or  $h(x) = (x - 1)(x + 2)^2$ ? Explain how you know.



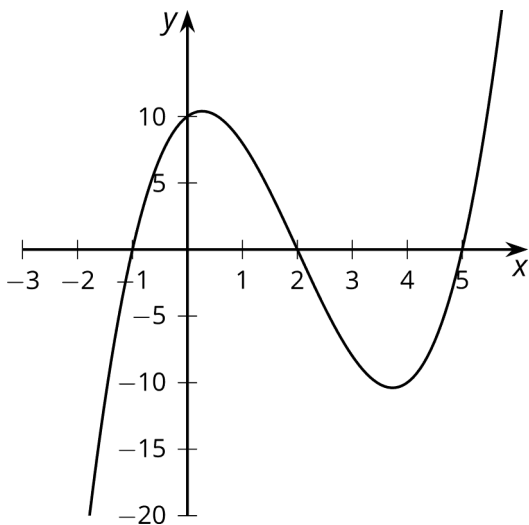
6. Which polynomial function has zeros when  $x = -2, \frac{3}{4}, 5$ ?

- A.  $f(x) = (x - 2)(3x + 4)(x + 5)$   
 B.  $f(x) = (x - 2)(4x + 3)(x + 5)$   
 C.  $f(x) = (x + 2)(3x - 4)(x + 5)$   
 D.  $f(x) = (x + 2)(4x - 3)(x - 5)$

7. Is this the graph of  $g(x) = -x^2(x - 2)$  or  $h(x) = x^2(x - 2)$ ? Explain how you know.



8. Which polynomial function's graph is shown here?



- A.  $f(x) = (x + 1)(x + 2)(x + 5)$   
 B.  $f(x) = (x + 1)(x - 2)(x - 5)$   
 C.  $f(x) = (x - 1)(x + 2)(x + 5)$   
 D.  $f(x) = (x - 1)(x - 2)(x - 5)$

9. Factor completely:  $4x^3 + 8x^2 - 12x$ .

10. Predict the end behavior of each polynomial function, then check your prediction using technology.

1.  $A(x) = (x + 3)(x - 4)(3x - 7)(4x - 3)$
2.  $B(x) = (3 - x)^2(6 - x)$
3.  $C(x) = -(4 - 3x)(x^4)$
4.  $D(x) = (6 - x)^6$

11. What are the factors of  $y^3 - 4y$ ?

- A.  $y(y - 2)(y - 2)$       B.  $y(y + 4)(y - 4)$   
 C.  $(y^2 + 1)(y - 4)$       D.  $y(y + 2)(y - 2)$

12. Factor completely:  $5x^3 - 20x^2 - 60x$

13. Factored completely, the expression  $12x^4 + 10x^3 - 12x^2$  is equivalent to
- A.  $x^2(4x + 6)(3x - 2)$   
 B.  $2(2x^2 + 3x)(3x^2 - 2x)$   
 C.  $2x^2(2x - 3)(3x + 2)$   
 D.  $2x^2(2x + 3)(3x - 2)$
14. When factored completely,  $x^3 + 3x^2 - 4x - 12$  equals
- A.  $(x + 2)(x - 2)(x - 3)$   
 B.  $(x + 2)(x - 2)(x + 3)$   
 C.  $(x^2 - 4)(x + 3)$   
 D.  $(x^2 - 4)(x - 3)$

15. Given the function:

$$g(x) = \frac{(x - 2)(3x + 2)}{(x + 4)(x - 2)(x - 6)}$$

- a) What are the equations of the asymptotes of the function?  
 b) Determine if there are any points of discontinuity. Explain why or why not.  
 c) Describe the end behavior as  $x$  approaches  $-\infty$ , and as  $x$  approaches  $+\infty$ .

16. Defend or contradict the following statement:

The function  $f(x) = \frac{x + 2}{x^2 - 4}$  has vertical asymptotes at  $x = 2$  and at  $x = -2$ .

17. Which of the following is a horizontal asymptote of  $f(x) = \frac{1}{x^2 - 16}$ ?

- A.  $x = -4$                       B.  $y = 4$   
 C.  $x = 1$                          D.  $y = 0$

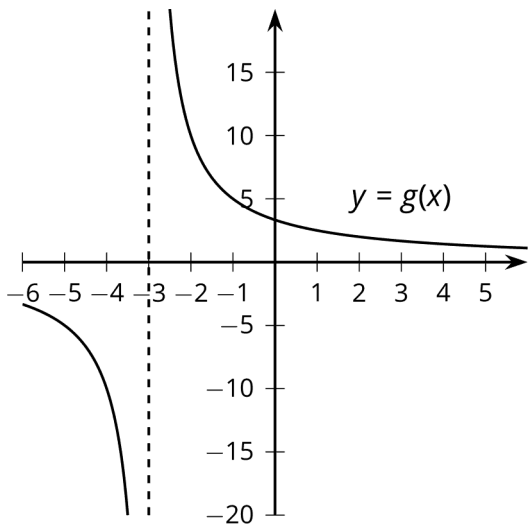
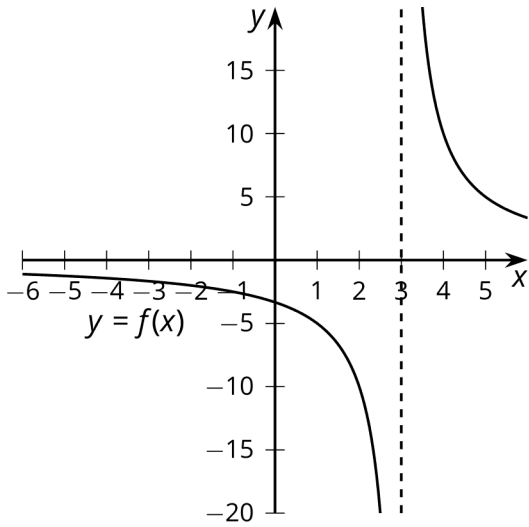
18. Which point is an  $x$ -intercept of  $f(x) = \frac{4x + 1}{x^2 - 1}$ ?

- A.  $(-1, 0)$                       B.  $(-0.25, 0)$   
 C.  $(0.25, 0)$                     D.  $(1, 0)$

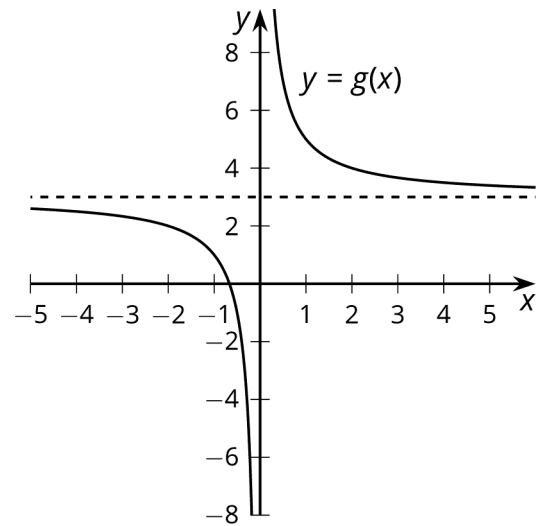
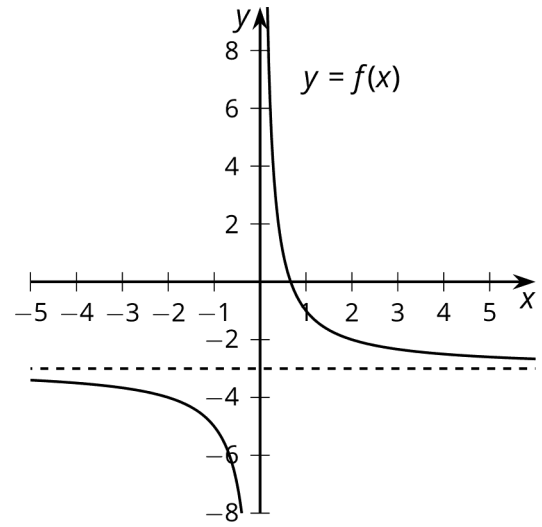
19. What are the horizontal and vertical asymptotes of  $f(x) = \frac{x^2 + 2x + 1}{x^2 + 3x - 4}$ ?

- A.  $x = 1$  and  $y = -1$   
 B.  $x = -4$ ,  $y = -1$ , and  $y = 1$   
 C.  $x = \pm 1$  and  $y = 0$   
 D.  $x = -4$ ,  $x = 1$ , and  $y = 1$

20. The graphs of two rational functions  $f$  and  $g$  are shown. Which function must be given by the expression of  $\frac{10}{x-3}$ ? Explain how you know.



21. The graphs of two rational functions  $f$  and  $g$  are shown. One of them is given by the expression  $\frac{2-3x}{x}$ . Which graph is it? Explain how you know.



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| <p>1.<br/>Answer:<br/>Points:      1</p> <p>2.<br/>Answer:<br/>Points:      1</p> <p>3.<br/>Answer:      D<br/>Points:      1</p> <p>4.<br/>Answer:<br/>Points:      1</p> <p>5.<br/>Answer:<br/>Points:      1</p> <p>6.<br/>Answer:<br/>Points:      1</p> <p>7.<br/>Answer:<br/>Points:      1</p> <p>8.<br/>Answer:<br/>Points:      1</p> <p>9.<br/>Answer:      <math>4x(x + 3)(x - 1)</math><br/>Points:      1</p> <p>10.<br/>Answer:<br/>Points:      1</p> <p>11.<br/>Answer:      D<br/>Points:      1</p> <p>12.<br/>Answer:      <math>5x(x + 2)(x - 6)</math><br/>Points:      1</p> <p>13.<br/>Answer:      D<br/>Points:      1</p> <p>14.<br/>Answer:      B<br/>Points:      1</p> | <p>15.<br/>Answer:      <math>x = -4, x = 6, \text{ and } y = 0</math>; [explanation];<br/>                 [description]<br/>Points:      1</p> <p>16.<br/>Answer:      [answers will vary]<br/>Points:      1</p> <p>17.<br/>Answer:      D<br/>Objective:    3.10<br/>Points:      1</p> <p>18.<br/>Answer:      B<br/>Objective:    2.05<br/>Points:      1</p> <p>19.<br/>Answer:      D<br/>Points:      1</p> <p>20.<br/>Answer:<br/>Points:      1</p> <p>21.<br/>Answer:<br/>Points:      1</p> |
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