

Practice Test 5

Graphing Polynomials/Rational Expressions

Classify each polynomial by its degree and number of terms. For example, you would classify the polynomial $3x^2 - 5x + 2.7$ as a *quadratic trinomial*.

1. 5

constant monomial

2. $1 + 13x^3$

cubic binomial

3. $-x^2$

quadratic monomial

4. $x^4 - x^2 + 3x^3$

quartic trinomial

5. $\frac{1}{2}x - \sqrt{3}$

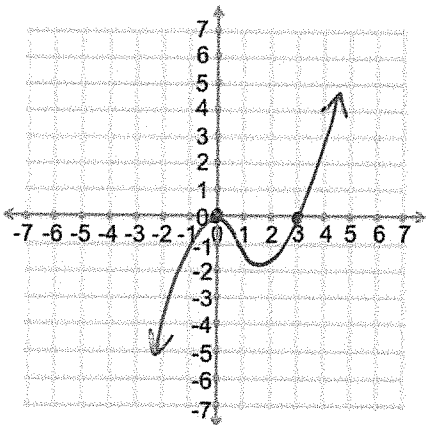
linear binomial

6. $\pi^3x^2 - x + \pi^4$

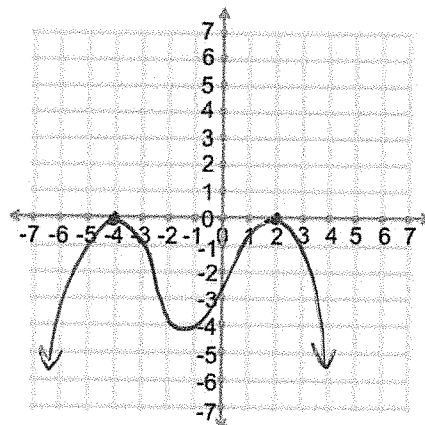
quadratic trinomial

Graph each polynomial. To get full credit your graph must include the correct end behavior and the correct behavior at each root (crossing or bouncing off the x-axis).

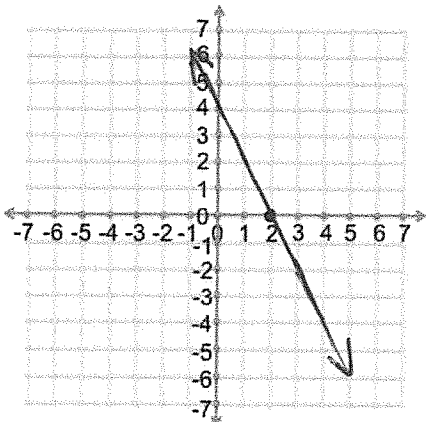
7. $f_1(x) = x^3 - 3x^2 = x^2(x-3)$



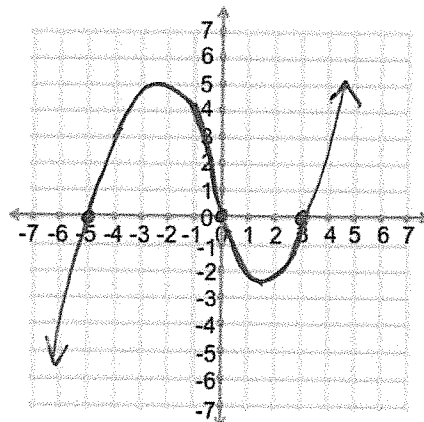
8. $f_2(x) = -2(x+4)^2(x-2)^2$



9. $f_3(x) = 4 - 2x$



10. $f_4(x) = x^3 + 2x^2 - 15x = x(x+5)(x-3)$



Find the domain of f , g , and h .

$$11. f(x) = \frac{2x^2 - 4x}{3x + 6}$$

$$\{x \in \mathbb{R} \mid x \neq -2\}$$

$$12. g(x) = \frac{1-x}{3}$$

$$\{x \in \mathbb{R}\}$$

$$13. h(x) = \frac{2}{x^2 - 4x} = \frac{2}{x(x-4)}$$

$$\{x \in \mathbb{R} \mid x \neq 0, 4\}$$

Simplify each rational expression.

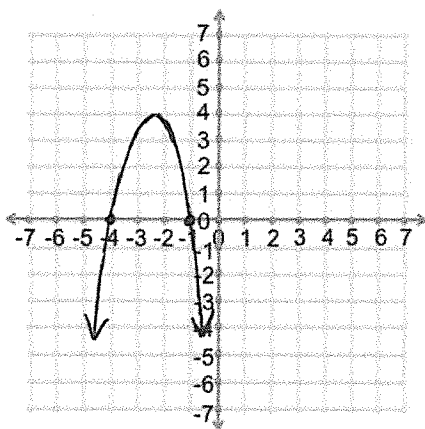
$$14. \frac{10ab^5}{15a^4b^4} = \frac{2b}{3a^3}$$

$$15. \frac{2x^2 - 8}{4x^2 - 4x - 8} = \frac{\cancel{2}(x+2)(\cancel{x-2})}{2 \cdot 2(\cancel{x-2})(x+1)}$$

$$= \frac{x+2}{2x+2}$$

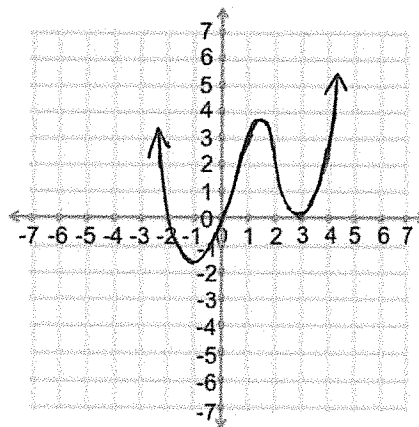
What functions are graphed below? Write your final answer for each question as a polynomial.

16.



$$f(x) = -(x+4)(x+1) = \boxed{-x^2 - 5x - 4}$$

17.



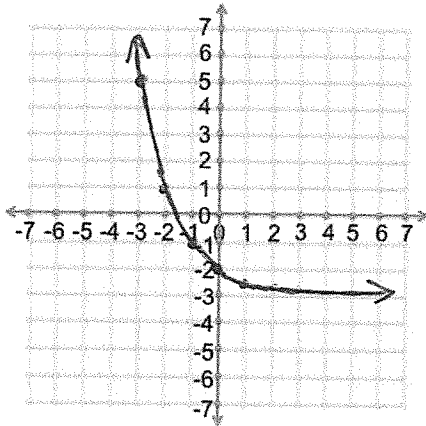
$$f(x) = x(x+2)(x-3)^2$$

$$= x(x+2)(x^2 - 6x + 9) =$$

18. What is the smallest number of x -intercepts an odd degree function can have? Why? $\boxed{x^4 - 4x^3 - 3x^2 + 18x}$

① The end behavior for an odd degree function is the opposite on either side (up/down or down/up) so it must cross the x -axis at least once.

19. Graph the function $f(x) = 2^{-x} - 3$ and state its domain and range.



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

Range: $(-3, \infty)$

Solve each equation.

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

$3 + x^2 = 4x$

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

$x = 3, 1$

Simplify.

22. $\frac{1}{x} - \frac{1}{x+1}$

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

23. $\frac{x^2-9}{x^2-7x+12} \div \frac{x^2-3x-4}{2x+2}$

$\frac{(x+3)(x-3)}{(x-4)(x-3)} \cdot \frac{2(x+1)}{(x-4)(x+1)}$

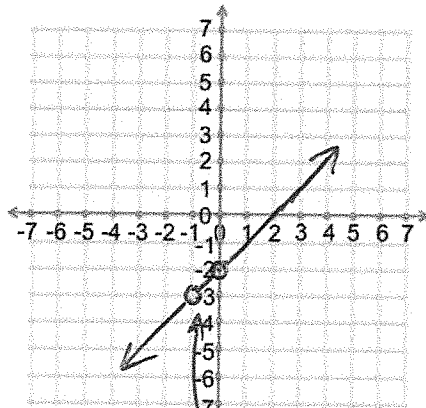
$= \frac{2(x+3)}{(x-4)^2} \text{ or } \frac{2x+6}{x^2-8x+16}$

Extra Credit: Graph the function $f(x) = \frac{x^3-x^2-2x}{x^2+x}$. (Hint: Find the domain and simplify the function.)

$D: \{x \in \mathbb{R} \mid x \neq 0, -1\}$

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

$= x-2$



holes at $x=0, -1$