Worksheet answer key

1. factor the following polynomials

a. $3x^2+14x+8$

"bottoms up" method

$3x^2+14x+8$

$x^2+14x+24$

$(x+12)(x+2)$

3 ↖ 3

$(3x+2)(x+4)$

24·1
12·2
8·3
6·4

b) $x^2-2x-15$

one has to be positive, one must be negative

$(x-5)(x+3)$

15|1
5|3

c) $5x^2+19x+12$

$5x^2+19x+12$ $\quad 5\cdot 12=60$

$x^2+19x+60$

$(x+15)(x+4)$

5 ↖ 5

$(x+3)(5x+4)$

60·1
30·2
20·3
15·4

2. Evaluate the following circle equation, and rewrite the equation in standard form

$x^2+y^2+6x-4y-23=0$

$+23 \quad +23$

$(x^2+6x+9)+(y^2-4y+4)=23+9+4$

$6/2 \to 3^2 = 9 \qquad -4/2 \to -2^2 = 4 \qquad 36$

$(x+3)^2 \qquad (y-2)^2$

$(x+3)^2+(y-2)^2=36 \qquad \sqrt{36}=6 \qquad r=6$

3. Write the following rational function with the following values

V.A @ $x=5, 9$

X-int @ $x=-2, -3$

hole @ $x=4$

$x=-2 \quad x=-3$

$+2 \quad +3$

$x=4$

-4

$x=5$

-5

$x=9$

-9

$x-5=0$ - V.A.

$x-9=0$ V.A.

$x+2=0$ x-int

$x+3=0$ x-int

$x-4=0$ hole

$$\frac{(x+2)(x+3)(x-4)}{(x-5)(x-9)(x+4)}$$

4. Evaluate the following rational inequality

$$\frac{3x-4}{x-2} < \frac{5}{x-2}$$

$$\frac{3x-4-5}{x-2} \Rightarrow \frac{3x-9}{x-2} < 0$$

$$\frac{3x-4}{x-2} - \frac{5}{x-2} < 0$$

common denominators

less than <

Numerator

$3x-9=0$

$\frac{3x=9}{3}$ $x=3$

Denominator

$x-2=0$

$x=2$

+	2	−	3	+
$(-\infty,2)$		$(2,3)$		$(3,\infty)$
1		2.5		4

$1 \Rightarrow \frac{3(1)-9}{1-2}$ $\frac{3-9}{-1}$ $\frac{-6}{-1}$ [6]

$2.5 \Rightarrow \frac{3(2.5)-9}{2.5-2}$ $\frac{7.5-9}{0.5}$ $\frac{-1.5}{0.5}$ $\Rightarrow$ [-3]

$4 \Rightarrow \frac{3(4)-9}{4-2}$ $\frac{12-9}{2}$ $\frac{3}{2}$

answer

$(2,3]$

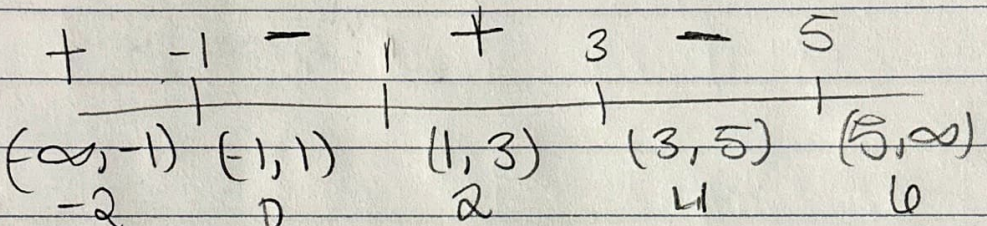
5. Evaluate the following rational inequality

$$\frac{x^2+4x+3}{x^2+4x-5} \geq 0$$

$$\frac{(x+3)(x+1)}{(x-5)(x+1)} \geq 0$$

$x=-3$ $x=-1$ x-ints

$x=5$ $x=1$ v.a.



$$\frac{(-2)^2-4(-2)+3}{(-2)^2-4(-2)-5} \to 2.1429 +$$

$$\frac{0^2-4(0)+3}{0^2-4(0)-5} \to -0.6 -$$

$$(-\infty,-1) \cup [1,3] \cup (5,\infty)$$

$$\frac{(2)^2-4(2)+3}{(2)^2-4(2)-5} \to 0.1111 +$$

$$\frac{4^2-4(4)+3}{4^2-4(4)-5} \to -0.6 -$$

$$\frac{(6)^2-4(6)+3}{6^2-4(6)-5} \to 2.1429 +$$

6. analyze the following rational functions:

$\frac{x^2+8x+12}{x+2}$ $\quad \frac{(x+6)(x+2)}{x+2}$

$$x+2 \overline{)\, x^2+8x+12}$$
$$x+6$$
$$-(x^2+2x)$$
$$6x+12$$
$$-(6x+12)$$
$$0$$

Slant asymptote
$y = x+6$
hole at $x=-2$
x-int at $x=-6$

7. Use polynomial long division to divide $x^3+9x^2+23x+15$ by $(x+1)$. Use the answer to find the rest of the factors

$$x+1 \overline{)\, x^3+9x^2+23x+15}$$
$$x^2+8x+15$$
$$-(x^3+x^2)$$
$$8x^2+23x$$
$$-(8x^2+8x)$$
$$15x+15$$
$$-(15x+15)$$
$$0$$

$x^2+8x+15$
$(x+3)(x+5)(x+1)$