

## Basic Skills Handout 2

Factor each expression completely or solve.

1)  $6(x + 4) + 5\sqrt{x + 4} - 6$

Answer:

$$(2\sqrt{x + 4} + 3)(3\sqrt{x + 4} - 2)$$

2)  $(5x - 3)(4x + 7) = 14x - 1$

Answer:

$$x = 4/5, \quad -5/4$$

3)  $80x^4 = 5$

Answer:

$$x = \pm \frac{1}{2}, \quad \pm \frac{1}{2}i$$

4)  $\log(2x + 1) + \log(4x - 3) = 2 \log 5$

Answer:

$$x = 2 \left( x \neq -\frac{7}{4} \right)$$

5)  $(x^2 - 2)^2 - 12(x^2 - 2) + 27 = 0$

Answer:

$$x = \pm\sqrt{5}, \quad \pm\sqrt{11}$$

6)  $x^2 > -25$

Answer:

$$(-\infty, \infty)$$

7)  $x^2 \leq -25$

Answer:

$$\emptyset$$

8)  $x^2 \geq 25$

Answer:

$$x \in (-\infty, -5) \cup (5, \infty)$$

9)  $-\frac{1}{3} + \frac{3}{15}|2x - 7| = \frac{2}{5}$

Answer:

$$x = \frac{16}{3}, \frac{5}{3}$$

10) Let  $f(x) = |7x - 9|$ ,  $g(x) = |3x + 8|$

Find all values of  $x$  for which  $f(x) = g(x)$ .

Answer:

$$x = \frac{17}{4}, \frac{1}{10}$$

11)  $-40x^3 - 42x^2 + 10x$

Answer:

$$-2x(4x + 5)(5x - 1)$$

12)  $x^2 + 10x - r^2 + 25$

Answer:

$$(x + 5 + r)(x + 5 - r)$$

13)

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

Answer:

$$x = 0$$

14)

$$\frac{2}{x^2 + 5x + 6} - \frac{x + 4}{x + 2}$$

Answer:

$$-\frac{x + 5}{x - 3}, \quad x \neq -2$$

15)  $2x^3 - 16$

Answer:

$2(x - 2)(x^2 + 2x + 4)$

16) Let  $f(x) = \sqrt{x + 10} + \sqrt{x - 5}$ . Find all values of  $x$  such that  $f(x) = 5$ .

Answer:

$x = 6$

17)  $16^{2x-7} = 32$

Answer:

$x = \frac{33}{8}$

18)  $e^{(x/2)-1} = 4$

Answer:

$x = (2 \ln 4) + 2$

19) Identify all vertical asymptotes of each function.

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

$g(x) = \frac{x^2 - 8x + 16}{x^2 + 5x + 4}$

$h(x) = \frac{x^2 - 8x + 16}{(x - 4)(x^2 + 1)}$

Answer:

$x = 2$  and  $x = -\frac{3}{4}$

Answer:

$x = -1$  and  $x = -4$

Answer:

None

20) Let  $f(x) = \frac{1}{2}x^2 - 5x + 3$ . Change the function into vertex form by completing the square. Next, use your result to find the vertex.

Answer:

$f(x) = \frac{1}{2}(x - 5)^2 - \frac{19}{2}$ ;  $V\left(5, -\frac{19}{2}\right)$

21) Let  $f(x) = 2x^2 - 3x + 6$  and  $g(x) = \sqrt{x - 3}$ . Simplify each difference quotient. (Our goal is to remove/cancel "h" from the denominator.)

$\frac{f(2 + h) - f(2)}{h}$

$\frac{g(7 + h) - g(7)}{h}$

$\frac{f(x + h) - f(x)}{h}$

$\frac{g(x + h) - g(x)}{h}$

Answer:

$5 + 2h$

Answer:

$4x - 3 + 2h$

Answer:

$\frac{1}{\sqrt{4 + h} + 2}$

Answer:

$\frac{1}{\sqrt{x + h - 3} + \sqrt{x - 3}}$

22) Sketch the graph of each function. (No answers provided. Check answers using a graphing utility. You may download free graphing software from my website or Google it.) Find the domain and range of each function.

$f(x) = 3(x - 2)^2 + 4$

$f(x) = -\frac{1}{2}(x + 4)^2 - 3$

$f(x) = |x + 4| + 1$

$f(x) = -(x - 2)^3 - 4$

$f(x) = -\sqrt{3 - x} + 1$

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

$f(x) = e^x + 1$

$f(x) = 2^{-x+1} - 3$

$f(x) = \ln x$

$f(x) = \log_2(x - 3)$