Name ANSWER KEY

Pre-Calculus; Review – Chapter 2B

Use either long division or synthetic division to divide.

1. $(2x^2 + 10x + 12) \div (x + 3)$

$-3 \mid 2 \quad 10 \quad 12$

$\quad\quad -6 \quad -12$

$2 \quad 4 \quad 0$

$2x + 4$

$x+3 \overline{)\, 2x^2 + 10x + 12}$

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

$4x + 12$

$-(4x + 12)$

0

$2x + 4$

2. $(4x^3 - 7x^2 - 11x + 5) \div (4x + 5)$

$x^2 - 3x + 1$

$4x+5 \overline{)\, 4x^3 - 7x^2 - 11x + 5}$

$-(4x^3 + 5x^2)$

$-12x^2 - 11x + 5$

$-(-12x^2 - 15x)$

$4x + 5$

$-(4x + 5)$

0

$x^2 - 3x + 1$ OR $4x^2 - 12x + 4$

3. $(2x^3 - 3x^2 - 50x + 75) \div (2x - 3)$

$x^2 - 25$

$2x-3 \overline{)\, 2x^3 - 3x^2 - 50x + 75}$

$-(2x^3 - 3x^2)$

$-50x + 75$

$-(-50x + 75)$

0

$x^2 - 25$ or $2x^2 - 50$

4. $(x^3 + 64) \div (x + 4)$

$-4 \mid 1 \quad 0 \quad 0 \quad 64$

$\quad\quad -4 \quad 16 \quad -64$

$1 \quad -4 \quad 16$

$x^2 - 4x + 16$

Perform the operation and write the result in standard form.

5. $(-1 + 8i) + (8 - 5i)$

$7 + 3i$

6. $(11 - 2i) - (-3 + 6i)$

$14 - 8i$

7. $22 - (-5 - 8i) - 9i$

$27 - i$

8. $(6 + 7i)^2$

$36 + 84i + 49i^2$

$-13 + 84i$

9. $-3i(6 - i)$

$-3 - 18i$

10. $(\sqrt{3} + \sqrt{15}i)(\sqrt{3} - \sqrt{15}i)$

$3 - 15i^2$

18

Solve the quadratic equation.

11. $x^2 + 64 = 0$

$x^2 = -64$

$x = \pm 8i$

12. $x^2 + 6x + 10 = 0$

$x = \dfrac{-6 \pm \sqrt{36 - 40}}{2}$

$= \dfrac{-6 \pm 2i}{2}$

$= -3 \pm i$

13. $x^2 - 2x + 2 = 0$

$x = \frac{2 \pm \sqrt{4-8}}{2}$

$= \frac{2 \pm 2i}{2}$

$= 1 \pm i$

14. $\frac{3}{2}x^2 - 6x + 9 = 0$

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

$x = \frac{4 \pm \sqrt{16-24}}{2}$

$= \frac{4 \pm 2i\sqrt{2}}{2}$

$= 2 \pm i\sqrt{2}$

In the following problems, find ALL of the zeros, then write the polynomial as a product of linear factors.

15. $f(x) = x^2 + 11x - 26$

$(x+13)(x-2) = 0$

$x = -13, 2$

$f(x) = (x+13)(x-2)$

16. $g(x) = x^4 - x^3 - 56x^2$

$x^2(x^2 - x - 56) = 0$

$x^2(x-8)(x+7) = 0$

$x = 0, 8, -7$

$g(x) = x^2(x-8)(x+7)$

17. $h(x) = x^2 + 10x + 23$

$x = \frac{-10 \pm \sqrt{100-92}}{2}$

$= \frac{-10 \pm 2\sqrt{2}}{2}$

$= -5 \pm \sqrt{2}$

$h(x) = [x - (-5+\sqrt{2})][x - (-5-\sqrt{2})]$

18. $k(x) = 81x^4 - 625$

$(9x^2 - 25)(9x^2 + 25) = 0$

$x^2 = \frac{25}{9}$

$x = \pm \frac{5}{3}, \pm \frac{5}{3}i$

$K(x) = (x - \frac{5}{3})(x + \frac{5}{3})(x - \frac{5}{3}i)(x + \frac{5}{3}i)$

— OR —

$K(x) = (3x-5)(3x+5)(3x-5i)(3x+5i)$

Find a 4th degree polynomial function with real coefficients that has the given zeros.

19. $4, -2, 5i$

$P(x) = (x-4)(x+2)(x-5i)(x+5i)$

$= (x^2 - 2x - 8)(x^2 + 25)$

$= x^4 + 25x^2 - 2x^3 - 50x - 8x^2 - 200$

$= x^4 - 2x^3 + 17x^2 - 50x - 200$

20. $1, 3, -3 + 5i$

$P(x) = (x-1)(x-3)[x - (-3+5i)][x - (-3-5i)]$

$= (x^2 - 4x + 3)[x^2 + 6x + 34]$

$= x^4 + 6x^3 + 34x^2 - 4x^3 - 24x^2 - 136x + 3x^2 + 18x + 102$

$= x^4 + 2x^3 + 13x^2 - 118x + 102$

Sketch a graph of the rational function by (a) finding intercepts, (b) finding asymptotes, (c) plotting a few extra points, and (d) drawing a smooth curve.

21. $f(x) = \frac{2x-1}{x-5}$

a) y-INTERCEPT ($x=0$)

$(0, \frac{1}{5})$

x-INTERCEPT ($y=0$)

$2x-1=0$

$(\frac{1}{2}, 0)$

B) VERTICAL ASYM.

$x-5=0$

$\boxed{x=5}$

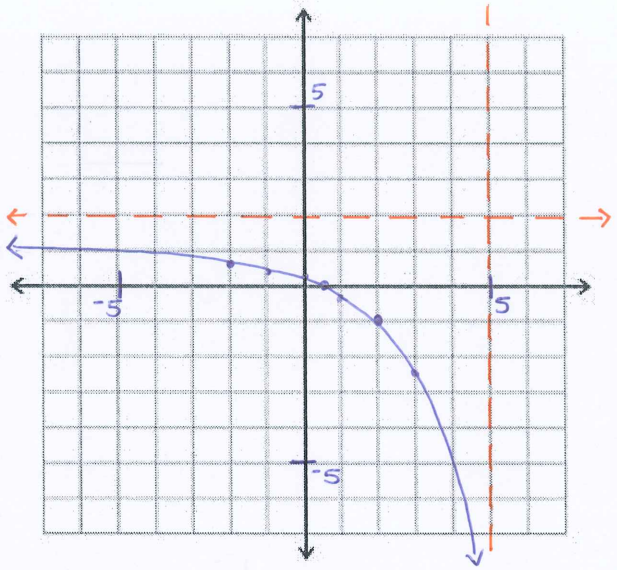
HORIZONTAL ASYM.

$n=m$

$y=\frac{2x}{x} \rightarrow \boxed{y=2}$

c)

x	y
-2	0.6
-1	0.3
1	-0.25
2	-1
3	-2.5



22. $f(x) = \frac{5x}{x^2-1}$

a) y-INTERCEPT ($x=0$)

$(0,0)$

x-INTERCEPT ($y=0$)

$5x=0$

$(0,0)$

B) VERTICAL ASYM.

$x^2=-1$

NONE

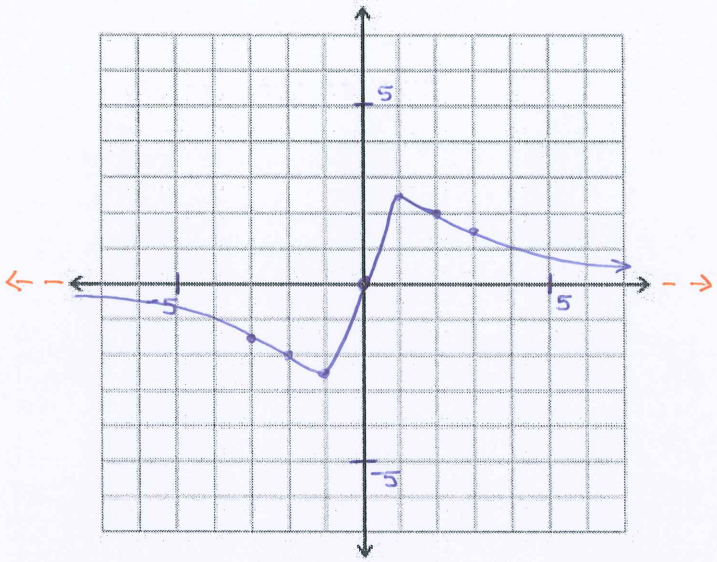
HORIZONTAL ASYM.

$n<m$

$\boxed{y=0}$

c)

x	y
-3	-1.5
-2	-2
-1	-2.5
0	0
1	2.5
2	2
3	1.5



23. $f(x) = \frac{2x^2+7x+3}{x+1}$

a) y-INTERCEPT ($x=0$)

$(0,3)$

x-INTERCEPT ($y=0$)

$(x+3)(2x+1)=0$

$(-3,0)\ (-\frac{1}{2}, 0)$

B) VERTICAL ASYM.

$x+1=0$

$\boxed{x=-1}$

HORIZONTAL ASYM.

$n>m$

$\boxed{\text{NONE}}$

c)

x	y
-6	-6.6
-5	-4.5
-4	-2.3
-2	3
1	6
2	8.3

SLANT ASYM.

$\boxed{y=2x+5}$

$$x+1 \overline{)\,2x^2+7x+3}$$

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

$$5x+3$$

$$-(5x+5)$$

$$-2$$