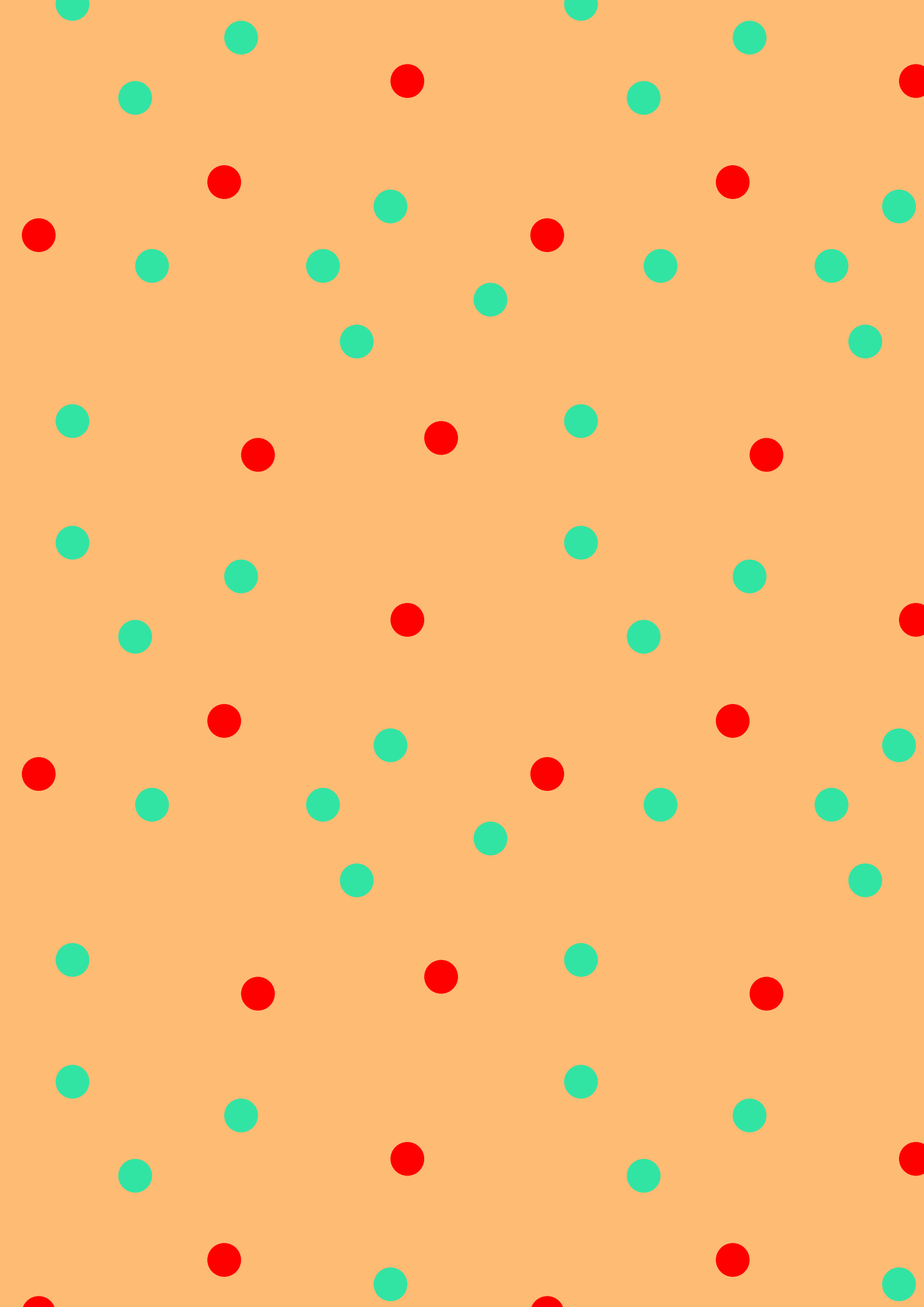

Assignment 4:

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2024331163

3.1

8.

(a) downwards

(b) (2, 4)

(c) $0 = -(x^2 + 4 + 2x) + 4$

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

$0 = -x^2 - 2x$

$x^2 = -2x$

$\frac{x^2}{x} = -2$

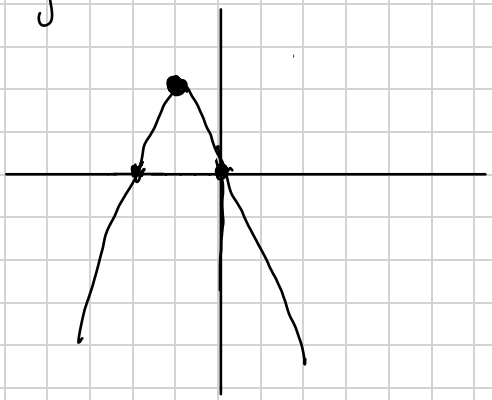
$x = +2$

x	0	1	2	3
y	0	-5	-12	-21

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

$y = 0$

(e)



(f) $x = -2$

(g) Max: 4

Min: $-\infty$

(h) Domain $= [-2, 2]$

Range $= (-\infty, 4]$

13.

$-\frac{1}{5}(x+4)^2 + 1$

(a) downwards

(b) $(-4, 1)$

(c) $\frac{(x+4)^2}{5} = 1$

$= (x+4)^2 = \sqrt{5}$

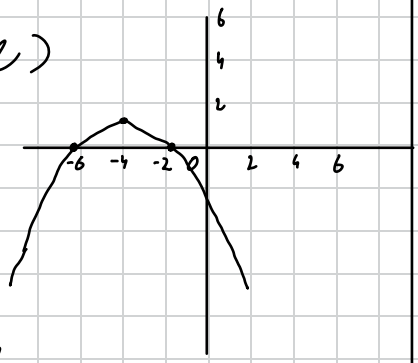
$= x = -4 \pm \sqrt{5}$

(d) $y = \frac{-16}{5} + 1$

$= \frac{-16 + 5}{5}$

$y = (0, -\frac{11}{5})$

(e)



(f) -4

(g) Max $= 1$

Min $= -\infty$

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

Range: $(-\infty, 1]$

16.

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

(a) $(x+4)^2 + 7 - 16$

$(x+4)^2 - 9$

(b) $(-4, -9)$

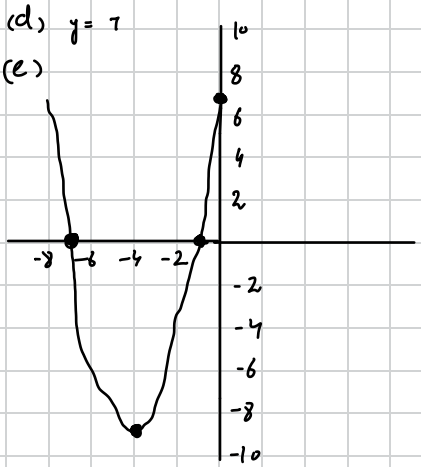
(c) $x + 4 = 3$

$x = -1$

$x = -7$

(d) $y = 7$

(e)



(f) -4

(g) Min $= -9$

(h) $x = (-\infty, \infty)$

$y = [-9, \infty)$

22. $k(x) = 3x^2 - 8x$

(a) $3(x^2 - \frac{8}{3}x)$

$3(x^2 - \frac{8}{3}x + \frac{16}{9} - \frac{16}{9})$

$= 3((x - \frac{4}{3})^2 - \frac{16}{9})$

$= 3(x - \frac{4}{3})^2 - \frac{16}{3}$

(b) $(\frac{4}{3}, \frac{-16}{3})$

(c) $\frac{16}{3} = 3(x - \frac{4}{3})^2$

$\frac{8}{3} \times \frac{1}{x}$

$(\frac{4}{3})^2 \quad \frac{16}{9}$

$\sqrt{\frac{16}{9}} = x - \frac{4}{3}$

$\frac{4}{3} + \frac{4}{3} = x$

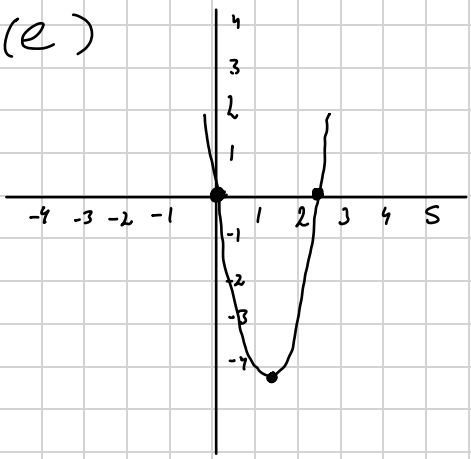
$\frac{8}{3} = x$

$0 = x$

(d) $3(\frac{16}{9}) - \frac{16}{3}$

$y = 0$

(e)



(f) $\frac{4}{3}$

(g) Min: $\frac{-16}{3}$

(h) Dom: $(-\infty, \infty)$

Range: $[-\frac{16}{3}, \infty)$

30.

$h(a) = 2a^2 + 14$

vertex $= \frac{-b}{2a}$

$= \frac{0}{4}$

(i) $a = 0$

(ii) $b = 0 + 14$

$b = 14$

$(0, 14)$ ans.

66.

$f(x) = 25x^2 - 20x + 4$

$= 400 - 4(25)(4)$

$= 400 - 400$

$x = 0$, 1 solution

70.

$25 - 4(-2)(-10)$

$= 25 - 80$

$= \boxed{-55}$

no real sol.

85

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

$5 = a(0-2)^2 - 3$

$5 = 4a - 3$

$\frac{8}{4} = a$

$a = 2$

$\boxed{y = 2(x-2)^2 - 3}$

88.

$h = -2 \quad K = 5$

$y = (x+2)^2 + 5$

$13 = a(16) + 5$

$13 = 16a + 5$

$\frac{8}{11} = a$

$\frac{1}{2} = a$

$\boxed{= \frac{1}{2}(x+2)^2 + 5}$

33.

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

(a) downwards

(b) $h = \frac{-b}{2a} \quad k = \frac{4ac - b^2}{4a}$

$h = \frac{-2}{-2} \quad k = g(1)$

$= 1 \quad = -1 + 2 - 4$

$h = 1 \quad = -3$

$K = -3$

$(1, -3)$

(c)

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

$= x^2 - 2x + 4$

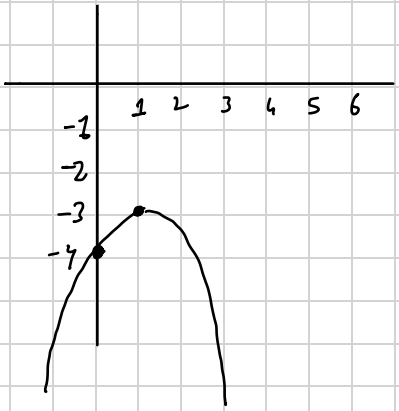
$= \frac{2 \pm \sqrt{4 - 4(1)}}{2}$

$= \frac{2 \pm \sqrt{-12}}{2}$

no x-intercept

(d) $y = -4$

(e)



(f) $x = 1$

(g) max $= -3$

(h) D: $(-\infty, \infty)$

R: $(-\infty, -3]$

---

42. $x^2 - 5x + 7 = r(x)$

(a) upwards

(b)

$h = \frac{-b}{2a}$

$h = \frac{5}{2} \quad k = r(\frac{5}{2})$

$K = \frac{3}{4} \quad = (\frac{5}{2})^2 - 5(\frac{5}{2}) + 7$

$= \frac{3}{4}$

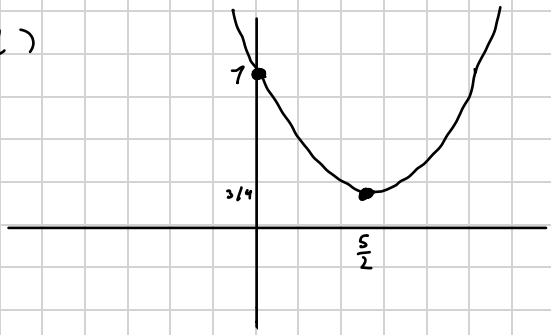
(c) $\frac{5 \pm \sqrt{25 - 4(7)}}{2}$

$= \frac{5 \pm \sqrt{25 - 28}}{2}$

$= \frac{5 \pm \sqrt{-3}}{2}$

(d) $y = 7$

(e)



(f) $x = \frac{5}{2}$

(g) min: $\frac{3}{4}$

(h) D: $(-\infty, \infty)$

R: $[\frac{3}{4}, \infty)$

3.2

90. $f(x) = 3x^2 + 12x + C$

$-4 = 3x^2 + 12x + C$

$x = -\frac{b}{2a}$

$x = \frac{-12}{6}$

$= -2$

$-4 = 12 - 24 + C$

$\boxed{8 = C}$

92.

$7 = -x^2 + bx - 2$

$x = \frac{-b}{2a}$

$x = \frac{\pm b}{\pm 2}$

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

$7 = \left(-\frac{b}{2}\right)^2 + b\left(\frac{b}{2}\right) - 2$

$= -\frac{b^2}{4} + \frac{b^2}{2} - 2$

$7 = \frac{b^2}{4} - 2$

$9 \times 4 = b^2$

$\sqrt{36} = b$

$\boxed{\pm 6 = b}$

13.

$f(x) = -3x^4 - 5x^2 + 2x - 6$

$-3x^4$ Degree = even

$\downarrow$

$-ve$

$x \to \infty, f(x) \to -\infty$

$x \to -\infty, f(x) \to -\infty$

20.

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

= leading term $-10x^8$ → same direction, downward

$x \to \infty \; g(x) \to -\infty$

$x \to -\infty \; g(x) \to -\infty$

23.

$x^3 + 2x^2 - 25x - 50$

multiplicity:

$\frac{p}{q} = \frac{\pm 1, \pm 2, \pm 5, \pm 10, \pm 50}{\pm 1}$

$(5) = 125 + 50 - 125 - 50$

$= 0$

5	1	2	-25	-50
		5	35	50
	1	7	10	0

$x^2 + 7x + 10$

$x^2 + 7x + 10 = 0$

$x^2 + 5x + 2x + 10$

$x(x+5) + 2(x+5)$

$x = -2 \quad x = -5$

$x = 5$

multiplicity = 1

35. $f(x) = 4x^4 - 37x^2 + 9$

$u = x^2$

$4u^2 - 37u + 9$

$= \frac{37 \pm \sqrt{1369 - 4(4)(9)}}{8}$

$= \frac{37 \pm \sqrt{1369 - 144}}{8}$

$= \frac{37 \pm \sqrt{1225}}{8}$

$= \frac{37 \pm 35}{8} = u$

$u = \frac{72}{8}$ or $u = \frac{2}{8}$

$x^2 = 9$ or $\frac{1}{4} = x^2$

$\boxed{x = \pm 3 \qquad x = \pm \frac{1}{2}}$

5
16
9
144
1369
144
1225
35
35
175
105 x
1225
35
37
72

39.

$f(x) = 2x^3 - 7x^2 - 14x + 30$

(a) $[1,2]$

$f(1) = 2 - 7 - 14 + 30 = 11$

$f(2) = 16 - 28 - 28 + 30 = -10$

yes

(b) $[2,3]$

$f(2) = -10$

$f(3) = 54 - 63 - 42 + 30$

$= 84 - 105$

no

(c) $[3,4]$

$f(3) = -ve$

$f(4) = -11$ no

(d) $f(4) = -11$

$f(5^-) = 25 + ve$

$=$ yes

175
70
245

25
7
175
44
5
70

43.

(a) $f(x) = 4x^3 - 8x^2 - 25x + 50$

$[-3, -2]$ $\quad -27$, $-\frac{1}{108}$

$f(-3) = 4(-27) - 8(9) - 25(-3) + 50$

$= -108 - 72 + 75 + 50$

$= -180 + 125$

$= -55$

$f(-2) = 4(-8) - 8(4) - 25(-2) + 50$

$= -32 - 32 + 50 + 50$

$= 36$

yes

(b) -2.5

59.

a. degree. 6

(b) even (same direction)
negative (downwards)

(c) 4 zeros

$x = -4$, multiplicity odd

$x = -3$, odd

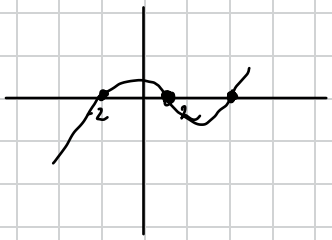
$x = -1$, even

$x = 2$, odd

62. $h(x) = \frac{1}{4}(x-1)(x-4)(x+2)$

$= x = 1 \quad x = 4 \quad x = -2$

leading term $= \frac{1}{4}x^3$



77. does not cross
because $(x-5)^{2}$ → even

false

92. $(x-c)^n$
if n is even, x-intercept is a touch point
and vice versa.

3.3

10. $(2x^3 - 7x^2 - 65) \div (x-5)$

$$
\begin{array}{r}
2x^2 + 3x + 15 \\
x-5 \overline{)\,2x^3 - 7x^2 + 0x - 65} \\
-(2x^3 - 10x^2) \\
\hline
0 + 3x^2 + 0x - 65 \\
-(3x^2 - 15x) \\
\hline
0 + 15x - 65 \\
-(15x - 75) \\
\hline
0 + 10 \leftarrow \text{remainder}
\end{array}
$$

15, $\frac{5}{75}$

19. $\frac{x^3 - 27}{x - 3}$

$$
\begin{array}{r}
x^2 + 3x + 9 \\
x-3 \overline{)\,x^3 - 27} \\
-(x^3 - 3x^2) \\
\hline
0 + 3x^2 - 27 \\
-(3x^2 - 9x) \\
\hline
0 + 9x - 27 \\
-(9x - 27) \\
\hline
0
\end{array}
$$

$= \boxed{x^2 + 3x + 9}$

27. $(4x^2 + 15x + 1) \div (x+6)$

$$
\begin{array}{r}
4x - 9 \\
x+6 \overline{)\,4x^2 + 15x + 1} \\
-(4x^2 + 24x) \\
\hline
0 - 9x + 1 \\
-(-9x - 54) \\
\hline
0 + 55 \leftarrow \text{remainder}
\end{array}
$$

$4x - 9 + \frac{55}{x+6}$ ans.

31. $(-5x^4 - 0x^3 - 3x^2 - 8x + 4) \div (x+2)$

$$
\begin{array}{r|rrrrr}
-2 & -5 & 0 & -3 & 8 & 4 \\
 & & 10 & -20 & 46 & -76 \\
\hline
 & -5 & 10 & -23 & 38 & -72
\end{array}
$$

$$
\begin{array}{r}
-5x^3 + 10x^2 - 23x + 38 \\
x+2 \overline{)\,-5x^4 - 0x^3 - 3x^2 - 8x + 4} \\
-(-5x^4 - 10x^3) \\
\hline
0 + 10x^3 - 3x^2 \\
-(10x^3 + 20x^2) \\
\hline
0 - 23x^2 - 8x \\
-(-23x^2 - 46x) \\
\hline
0 + 38x + 4 \\
-(38x + 76) \\
\hline
-72
\end{array}
$$

$= \boxed{-5x^3 + 10x^2 - 23x + 38 - \frac{72}{x+2}}$

35. $\frac{x^5+32}{x+2}$

-2	1	0	0	0	0	32
		-2	4	-8	16	-32
	1	-2	4	-8	16	0

$= x^4 - 2x^3 + 4x^2 - 8x + 16$

41. $2x^4 - 5x^3 + x^2 - 7$

(a) $f(4) = 512 - 320 + 16 - 7$

$= \boxed{201}$

(b) $\boxed{201}$

48. $2x^4 + 13x^3 - 10x^2 - 19x + 14$

(a) $-2 \rightarrow$ No

-2	2	13	-10	-19	14
		-4	-18	56	-74
	2	9	-28	37	-60

(b)

-7	2	13	-10	-19	14
		-14	7	21	-14
	2	-1	-3	2	0

$-7 \rightarrow$ yes

53. $g(x) = x^3 - 11x^2 + 25x + 37$

a. $6+i \rightarrow$ yes

6+i	1	-11	+25	37
		6+i	-31+i	-37
	1	-5+i	-6+i	0

b.

6-i	1	-11	25	37
		6-i	-31-i	-37
	1	-5-i	-6-i	0

yes

55

$f(x) = x^4 + 11x^3 + 41x^2 + 61x + 30$

a. $x+5$ yes b. $x-2$ No

-5	1	11	41	61	30
		-5	-30	-55	-30
	1	6	11	6	0

2	1	11	41	61	30
		2	26	134	390
	1	13	67	195	420

60.

$f(x) = 3x^3 - x^2 - 54x + 18$

a. No

2	3	-1	-54	18
		6	10	-88
	3	5	-44	-70

No

b.

$3\sqrt{2}$	3	-1	-54	18
		$9\sqrt{2}$	53	$-3\sqrt{2}$
	3	$9\sqrt{2}-1$	-1	$18-3\sqrt{2}$

62. $h(x) = x^3 - 15x^2 + 44$

(a) $h(\sqrt{11})$

$= 121 - 15(11) + 44$

$= 0$

15
11
15
15x
165

(b) 0

66.

a. $f(x) = 3x^3 + 16x^2 - 5x - 50$

-2	3	16	-5	-50
		-6	-20	50
	3	10	-25	0

$(3x^2 + 10x - 25)(x+2)$

b. $3x^3 + 16x^2 - 5x - 50 = 0$

$= \frac{-10 \pm \sqrt{100 - 4(3)(-25)}}{6}$

$= \frac{-10 \pm \sqrt{100 + 300}}{6}$

$= \frac{-10 \pm 20}{6} = \frac{5}{3}$ or -5

25
12
50
25x
300

$\boxed{(x+5)(3x-5)(x+2)}$

70. $f(x) = 4x^3 - 20x^2 + 33x - 18$

a.

2	4	-20	33	-18
		8	-24	18
	4	-12	9	0

$(4x^2 - 12x + 9)(x-2)$

(b) $4x^2 - 6x - 6x + 9$

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

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

answer.

77.

$(x+2)(x-3i)(x+3i)$

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

$= x^3 + 2x^2 + 9x + 18$

92.

$(x-3), (2x^3 - 7x^2 + mx + 6)$

3	2	-7	m	6
		6	-3	3m-9
	2	-1	m-3	6+3m-9

$-3 + 3m = 0$

$\boxed{m = 1}$

3.4

7. $f(x) = x^5 - 2x^3 + 7x^2 + 4$

$p/q = \pm 1, \pm 2, \pm 4$

12. $-16x^4 - 7x^3 + 2x + 6$

$p/q = \dfrac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2, \pm 4, \pm 8, \pm 16}$

$= \pm 1; \pm 2; \pm 3; \pm 6; \pm \frac{3}{2}; \pm \frac{1}{2}; \pm \frac{1}{4}; \pm \frac{1}{8}; \pm \frac{1}{16}$
$\pm \frac{3}{4}; \pm \frac{3}{8},$

15. $P(x) = 2x^4 - x^3 - 5x^2 + 2x + 2$

$p/q = \dfrac{\pm 1, \pm 2}{\pm 1, \pm 2}$

$= \pm 1, \pm \frac{1}{2}, \pm 2 \quad | \quad 2x^3 - x^2 - 4x - 2$

1	2	-1	-5	2	2
		2	1	-4	-2
	2	1	-4	-2	0

$2x+1 \overline{)\ 2x^3 + x^2 - 4x - 2}$ $\quad x^2 - 2$

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

$0 \quad 0 \quad -4x - 2$

$-(-4x - 2)$

$0 \quad -4$

$= \boxed{1, -\frac{1}{2}, 2, -2}$

20

$g(x) = x^3 - 7x^2 + 14x - 6$

$p/q = \pm 1, \pm 2, \pm 3, \pm 6$

$= 1 - 7 + 14 - 6$

$= 0$

$x-3 \overline{)\ x^3 - 7x^2 + 14x - 6}$ $\quad x^2 - 4x + 2$

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

$0 \quad -4x^2 + 14x - 6$

$-(-4x^2$

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

$= \dfrac{+4 \pm \sqrt{16 - 8}}{2}$

$= \dfrac{+4 \pm \sqrt{8}}{2}$

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

$x = 3$

27.

$f(x) = x^4 - x^2 - 90$

$u = x^2$

$u^2 - u - 90$

$u^2 - 10u + 9u - 90$

$u(u-10) + 9(u-10)$

$u = -9 \quad u = 10$

$x = \pm 3i \quad \boxed{x = \pm\sqrt{10}}$

35. $3x^3 - 28x^2 + 83x - 68$

a.

$(x - 4 + i)(x - 4 - i) = (x-4)^2 + 1$

$= x^2 - 8x + 17$

$x^2 - 8x + 17 \overline{)\ 3x^3 - 28x^2 + 83x - 68}$ $\quad 3x - 4$

$-(3x^3 - 24x^2 + 51x)$

$0 \quad -4x^2 + 32x - 68$

$-(-4x^2 + 32x - 68)$

$0 \quad 0 \quad 0$

$x = \frac{4}{3}$

(a) $4+i, \ 4-i, \ \frac{4}{3} = x$

(b) $(x^2 - 8x + 17)(3x - 4)$

(c) $x = \frac{4}{3}$

43. $-\frac{4}{3} = x \qquad x = \frac{1}{2}$

$(3x+4)^2 \qquad (2x-1)$

$(9x^2 + 16 + 24x)(2x - 1)$

$18x^3 + 32x + 48x^2 - 9x^2 - 16 - 24x$

$18x^3 + 39x^2 + 8x - 16 = f(x)$

48.

$x = -3i$ $\quad x = 5+2i$

$(x+3i)(x-3i)$ $\quad (x-5+2i)(x-5-2i)$

(x^2+9) $\quad (x-5)^2 - 4i^2$

$(x-5)^2 + 4$

$x^2+25-10x+4$

(x^2+9) $\quad (x^2-10x+29)$

$= x^2(x^2-10x+29) + 9(x^2-16x+29)$

$= x^4 - 10x^3 + 29x^2 + 9x^2 - 90x + 261$

$\boxed{= x^4 - 10x^3 + 38x^2 - 90x + 261}$

50.

$3x^7 + 4x^6 - 6x^3 + 5x^2 - 6x + 1$

Positive:

3, 4, -6, 5, -6, 1

$\boxed{+ve = 4, 2, 0}$

negative:

$3(-x)^7 + 4(-x)^6 - 6(-x)^3 + 5(-x)^2 - 6(-x) + 1$

$-3x + 4x^6 + 6x^3 - 5x^2 + 6x + 1$

-3, 4, 6, 5, 6

$\boxed{1}$ -ve

55.

$v(x) = \frac{1}{8}x^6 + \frac{1}{6}x^4 + \frac{1}{3}x^2 + \frac{1}{10}$

Positive:

$= \frac{1}{8}, \frac{1}{8}, \frac{1}{3}$

$\boxed{0}$

Negative:

$\boxed{0}$

58.

$f(x) = -5x^8 - 3x^6 - 4x^2$

$x(-5x^7 - 3x^5 - 4x)$

$= -5x^7 - 3x^5 - 4x + 1$

$= -5, -3, -4, 1$

Positive:

$\boxed{1}$

Negative:

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

$= 5x^7 + 3x^5 + 4x + 1$ $\boxed{0}$

Total 0 = 8

$\boxed{\begin{array}{l} 1 + ve \\ 0 - ve \\ 1 = 0 \\ 6 = \text{complex zeros} \end{array}}$

3.5

8. $x \neq 3$ $\quad \boxed{(-\infty, 3) \cup (3, \infty)}$

10. $\frac{3x-5}{2x^2+5x-7}$ $\quad (2x^2+7x-2x-7)$

$x(2x+7) - 1(2x+7)$

$\frac{3x-5}{(x-1)(2x+7)}$

$x \neq 1, x \neq -\frac{7}{2}$

$\boxed{(-\infty, -\frac{7}{2}) \cup (-\frac{7}{2}, 1) \cup (1, \infty)}$

15.

(a) -1

(b) ∞

(c) ∞

(d) -1

(e) $(-\infty, -3)$

(f) $(-3, \infty)$

(g) $(-\infty, -3) \cup (-3, \infty)$

(h) $(-1, \infty)$

(i) $x = -3$

(j) $y = -1$

20.

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

$\boxed{x = \frac{1}{3} \quad x = -3}$

23.

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

$= \frac{-4 \pm \sqrt{16 - 4(2)(-3)}}{4}$

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

$\frac{-2 \pm \sqrt{40}}{}$

$= -1 \pm \sqrt{10}$

$\boxed{\begin{array}{l} = -1 + \sqrt{10} \\ = -1 - \sqrt{10} \end{array}}$

36. $\frac{8}{x^2+4x+4}$

(a) $\boxed{y=0}$ (b) does not cross

36. $\frac{x+3}{2x^3-3x-5}$

(a) $\boxed{y=0}$

(b) $x+3=0$

$\boxed{x=-3}$

$2(-3)^2-3(-3)-5 = 22 \neq 0$

39. $\frac{2x^2+3}{x}$

no horizontal asymptote.

$$x \overline{)\,2x^2+3}\ \Big|\ 2x$$
$$-(2x^2)$$
$$3$$

$\boxed{2x+\frac{3}{x}}$

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

$(x^2)(x+1)-4(x+1) = (x+1)(x^2-4)$

$=(x+1)(x+2)(x-2)$

Vertical asymptotes:

$\boxed{\begin{array}{l} x=-1 \\ x=2 \\ x=-2 \end{array}}$

horizontal:

$\boxed{y=0}$

50 $\frac{1}{x+4} = g(x)$

60 $\frac{5x-8}{x^2-4}$

a. $\boxed{\frac{8}{5}=x}$ $(\frac{8}{5}, 0)$

b. $x^2-4=0 \Rightarrow \boxed{\begin{array}{l} x=-2 \\ x=2 \end{array}}$

3.6

15 a) $x = \frac{3}{5}$ $x = 5$

b) $(\frac{3}{5}, 5)$

c) $[\frac{3}{5}, 5]$

d) $(-\infty, \frac{3}{5}) \cup (5, \infty)$

e) $(-\infty, \frac{3}{5}] \cup [5, \infty)$

23. $3w^2 + w < 2w + 4$

$\frac{1 + \sqrt{49}}{6} = \frac{4}{3}$

27. $-5x^2 - 6x + 10 > 0$

$= \frac{-6 \pm \sqrt{36 + 200}}{10}$

$= \frac{-6 + 2\sqrt{59}}{10}$

$= -3 + 2\sqrt{59}, -3 - 2\sqrt{59}$

33. $x = -4$

$x = 1$

$x = 3$

$S = [-4, 1] \cup [3, \infty)$

37. $t^4 - 10t^2 + 9$

$(t^2 - 1)(t^2 - 9)$

$t = \pm 1$ $t = \pm 3$

$[-3, -1] \cup [1, 3]$

40. $3x^3 - 3x < 4x^2 - 4$

$3x - 4 < 0$

$[-\infty, -1] \cup [1, \frac{4}{3}]$

54. $x^2 + 4x + 2x + 8 \leq -1$

$x^2 + 6x + 9 \leq 0$ $S = \{3\}$

60. $(-\infty, -4) = (> 0)$

$(-4, 1) = (< 0)$

$(1, \infty) = (> 0)$

a) $[-4, 1)$ c) $(-\infty, -4] \cup (1, \infty)$

b) $(-4, 1)$ d) $(-\infty, -4) \cup (1, \infty)$

63. $\frac{5 - x}{x + 1} \geq 0$ $-x + 5 = 0$ $x + 1 = 0$

$(-\infty, -1) : (< 0)$

$(-1, 5) = (> 0)$

$(5, \infty) = (< 0)$

68. $\frac{p^2 - 2p - 8}{p - 1}$ $(p + 2)(p - 4)$ $p = -2$ $p = 4$

$(-\infty, -2) = (< 0)$

$(-2, 1) = (> 0)$

$(1, 4) = (< 0)$ $[-2, 1) \cup [4, \infty)$

$(4, \infty) = (> 0)$

79. $(-3, -1] \cup [0, \infty)$

93. $x = \pm 3$ $[-3, 3]$

99. $(-\infty, 6) \cup (\frac{3}{2}, \infty)$

162. $K(x) = \sqrt{\frac{2x}{2x + 1}}$ $x = 0$ $x = -1$

$(-\infty, -1) \cup (0, \infty)$