

Solving Equations

Sec. 1.3 Solve by Factoring

What are the roots of the equation

$$x^2 - x - 42 = 0? \quad \begin{array}{l} 1 \cdot 42 \\ 2 \cdot 21 \\ 3 \cdot 14 \\ 6 \cdot 7 \end{array} \quad \begin{array}{l} \text{roots/x-intercepts/} \\ \text{zeros} \rightarrow y=0 \end{array}$$

① factor $(x+6)(x-7)=0$

Zero Product Property

If $AB=0$, then $A=0$ or $B=0$

$$x+6=0$$

$$\begin{array}{r} -6 \quad -6 \\ \hline x = -6 \end{array}$$

$$x-7=0$$

$$\begin{array}{r} +7 \quad +7 \\ \hline x = 7 \end{array}$$

Note: SOLUTION: value(s) of a variable(s) which make the statement true

Ex: $0 = x^2 + 5x - 14$

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

$$x-2=0 \quad x+7=0$$

$$\begin{array}{r} x = 2 \quad x = -7 \end{array}$$

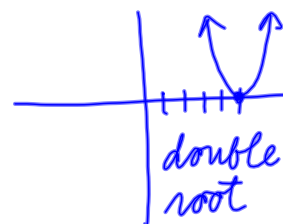
Ex: $f(x) = x^2 - 10x + 25$ Find the zeros.

$$0 = (x-5)(x-5) \text{ or } (x-5)^2$$

$$x-5=0 \quad x-5=0$$

$$\begin{array}{r} x = 5 \end{array}$$

$$x = 5$$



Sec. 1.4 Solve $ax^2 + bx + c = 0$ by Factoring

Ex:

$a \cdot \begin{matrix} 1 \cdot 4 \\ 2 \cdot 2 \end{matrix} \underline{4x^2} - \overset{\begin{matrix} 1 \cdot 15 \\ 3 \cdot 5 \end{matrix}}{17x} - \underline{15} = 0$

"Guess & Check"

$(2x + 1)(2x - 15) \quad -30x + 2x$
 $(2x + 3)(2x - 5) \quad -10 + 6x$
 $(x + 1)(4x - 15) \quad -15 + 4x$
 $(x + 15)(4x - 1) \quad -1 + 60x$
 $(x + 3)(4x - 5) \quad -5 + 12x$
 $(x + 5)(4x - 3) \quad -3x + 20x$
 $(x - 5)(4x + 3) = 0$

"Un-factoring"

① Multiply $a \cdot c = -60$

② Factor ac

1 · 60
2 · 30
<u>3 · 20</u> <u>+3 · -20</u>
4 · 15
5 · 12

③ Replace middle term $6 \cdot 10$

$$4x^2 - 17x - 15 = 0$$

$$\underline{4x^2} + \underline{3x} - \underline{20x} - \underline{15} = 0$$

Grouping

$$x(4x + 3) - 5(4x + 3) = 0$$

$$(x - 5)(4x + 3) = 0$$

$$x - 5 = 0$$

$$\boxed{x = 5}$$

$$4x + 3 = 0$$

$$\begin{array}{r} -3 \quad -3 \\ \hline 4x = -3 \\ \frac{4x}{4} = \frac{-3}{4} \end{array}$$

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

$$b. \quad \begin{array}{r} 3x^2 + 22x + 60 = -14x - 48 \\ + 14x + 48 \quad + 14x + 48 \\ \hline \end{array}$$

$$\frac{3x^2}{3} + \frac{36x}{3} + \frac{108}{3} = \frac{0}{3}$$

$$x^2 + 12x + 36 = 0$$

$$(x + 6)(x + 6) = 0$$

$$\boxed{x = -6}$$

1.36
2.18
3.12
4.9
6.6

$$c. \quad 7a^2 - 30a + 8 = 0$$

$$\underline{7a^2 - 2a - 28a + 8} = 0$$

$$a(7a - 2) - 4(7a - 2) = 0$$

$$(a - 4)(7a - 2) = 0$$

$$a - 4 = 0 \quad \frac{7a - 2 = 0}{+2 \quad +2}$$

$$a = 4 \quad \frac{7a}{7} = \frac{2}{7}$$

$$\boxed{a = 4, a = \frac{2}{7}}$$

$$a = 4, \frac{2}{7}$$

p. 22 (25-37)
odd

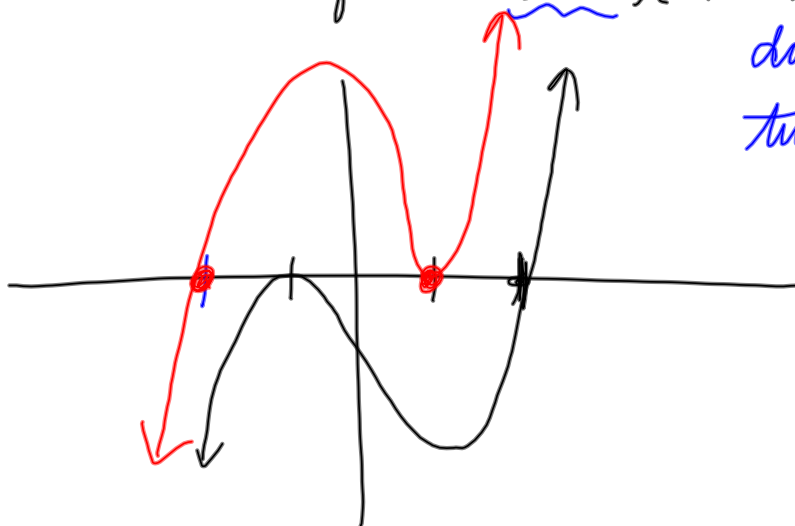
p. 29 (33-49) odd
(53-58)

56
1.56
2.28 -2, -28
4.14
7.8

p. 148 (13)

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

double root
turning point



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

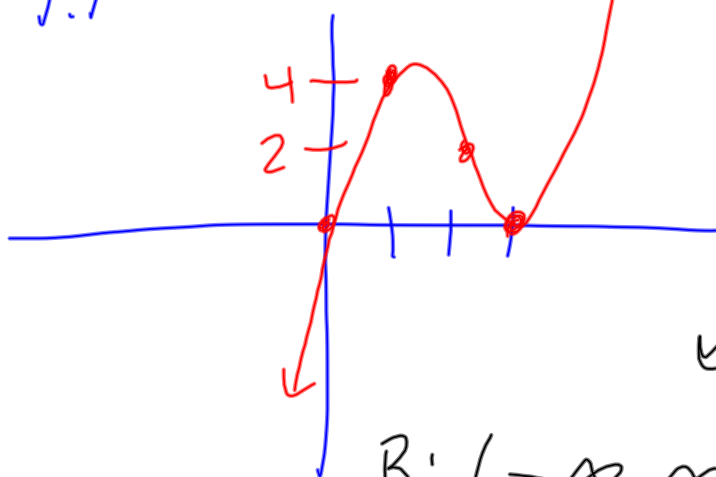
$$x=0 \quad x=3$$

T.P

degree : 3 \rightarrow odd

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

x	y	
1	4	$1(-2)^2$
2	2	$2(-1)^2$



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