$x^3 + x^2 - 2x$

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

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

FROM TEST 5

$\therefore \mathcal{D}\left(\frac{x-7}{x^3+x^2-2x}\right) = \{x \mid x \neq 0 \ \& \ x \neq -2 \ \& \ x \neq 1\}$

§ 7.2 # 53, 93, 97

53 $\dfrac{(x^3)^{\frac{1}{2}}}{x^{\frac{7}{2}}} = \dfrac{x^{(3)(\frac{1}{2})}}{x^{\frac{7}{2}}}$

$(3)(\frac{1}{2}) =$

$(\frac{3}{1})(\frac{1}{2}) = \frac{3 \cdot 1}{1 \cdot 2} = \frac{3}{2}$

$\frac{7}{2} - \frac{3}{2} = \frac{4}{2} = 2$

$\frac{3}{2} - \frac{7}{2} = \frac{-4}{2} = -2$

$= \dfrac{x^{\frac{3}{2}}}{x^{\frac{7}{2}}} =$

$x^{\frac{3}{2} - \frac{7}{2}} = x^{-2} = \dfrac{1}{x^2}$

$\dfrac{1}{x^{\frac{7}{2} - \frac{3}{2}}} = \dfrac{1}{x^2}$

93

$\sqrt{3} \cdot \sqrt[3]{4} = 3^{\frac{1}{2}} \cdot 4^{\frac{1}{3}}$

LCM of 3 & 2 is
$3 \cdot 2 = 6$

$\frac{1}{2} = \frac{1}{2} \cdot \frac{3}{3} = \frac{3}{6}$

$\frac{1}{3} = \frac{1}{3} \cdot \frac{2}{2} = \frac{2}{6}$

$= 3^{\frac{3}{6}} \cdot 4^{\frac{2}{6}}$

$a^c \cdot b^c = (ab)^c$

$= (3^3)^{\frac{1}{6}} \cdot (4^2)^{\frac{1}{6}}$

$= (3^3 \cdot 4^2)^{\frac{1}{6}}$

$= \sqrt[6]{3^3 \cdot 4^2}$

$= \sqrt[6]{432}$

$\frac{3}{6} = 3 \cdot \frac{1}{6}$

$3^{\frac{3}{6}} = 3^{3 \cdot \frac{1}{6}} = (3^3)^{\frac{1}{6}}$

$(a^b)^c = a^{bc}$

$\frac{2}{6} = 2 \cdot \frac{1}{6}$

$4^{2 \cdot \frac{1}{6}} = (4^2)^{\frac{1}{6}}$

93

$\sqrt{3} \cdot \sqrt[3]{4} = 3^{\frac{1}{2}} \cdot 4^{\frac{1}{3}}$

LCM of 3 & 2 is
$3 \cdot 2 = 6$

$= 3^{\frac{3}{6}} \cdot 4^{\frac{2}{6}}$

$(a \cdot b)^c = a^c b^c$

$\frac{1}{2} \cdot \frac{3}{3} = \frac{3}{6}, \quad \frac{1}{3} \cdot \frac{2}{2} = \frac{2}{6}$

$(a^b)^c = a^{bc}$

$= (3^3 \cdot 4^2)^{\frac{1}{6}}$

$a^{\frac{1}{n}} = \sqrt[n]{a}$

$= \sqrt[6]{3^3 \cdot 4^2}$

$= \sqrt[6]{432}$

$$\sqrt{5r} \cdot \sqrt[3]{s}$$

$$= (5r)^{\frac{1}{2}} (s)^{1/3}$$

$$= (5r)^{\frac{3}{6}} (s)^{\frac{2}{6}}$$

$$= \sqrt[6]{(5r)^3 (s)^2}$$

$$= \sqrt[6]{125 r^3 s^2}$$

$$(5r)^3 = 5^3 r^3$$

73 Product Rule

$$\sqrt[n]{a}\,\sqrt[n]{b} = \sqrt[n]{ab}$$

$$a^{\frac{1}{n}} b^{\frac{1}{n}} = (ab)^{\frac{1}{n}}$$

Quotient

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$

Non Example $\dfrac{\sqrt[3]{x}}{\sqrt[4]{y}}$ = Does not apply.

Not Same.

$$\sqrt{2}\sqrt{7} = \sqrt{14}$$

$$\sqrt{2}\cdot\sqrt{7}$$

$$(\sqrt{2})(\sqrt{7})$$

Pg 431 has a bunch of perfect squares, etc.

$$\sqrt[3]{2}\,\sqrt[3]{32} = \sqrt[3]{64} = 4$$

Primes : 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31

Factor 64 into product of powers of primes.

1	2	64
2	2	32
3	2	16
4	2	8
5	2	4
6		2

$$\sqrt[3]{64} = \sqrt[3]{2^6} = (2^6)^{\frac{1}{3}}$$

$$= 2^{\frac{6}{3}} = 2^2 = 4$$

$$\sqrt{18} = \sqrt{9\cdot 2} = \sqrt{9}\sqrt{2} = 3\sqrt{2}$$

$$\sqrt[3]{40} = \sqrt[3]{8\cdot 5} = \sqrt[3]{8}\sqrt[3]{5} = 2\sqrt[3]{5}$$

$$\sqrt[4]{162} = \sqrt[4]{81\cdot 2} = \sqrt[4]{81}\sqrt[4]{2}$$

$$= 3\sqrt[4]{2}$$

$$2\,\underline{\big)\,162}$$
$$81$$

$$\sqrt[3]{40} = \sqrt[3]{2^3 \cdot 5}$$

$$\begin{array}{r|l} 2 & 40 \\ 2 & 20 \\ 2 & 10 \\ & 5 \end{array}$$

$$= \sqrt[3]{2^3}\,\sqrt[3]{5}$$

1 2 4 5 6 12 1 1 1 12

$$= 2\sqrt[3]{5}$$

$$\begin{array}{r|l} 2 & 162 \\ 3 & 81 \\ 3 & 27 \\ 3 & 9 \\ & 3 \end{array}$$

$$\sqrt[4]{162} = \sqrt[4]{3^4 \cdot 2}$$

$$\sqrt[4]{3^4}\,\sqrt[4]{2} = 3\sqrt[4]{2}$$

Assume $x \geq 0$:

$$\sqrt[6]{x^7} = \sqrt[6]{x^{6+1}} = \sqrt[6]{x^6 \cdot x^1}$$

$$= \sqrt[6]{x^6}\,\sqrt[6]{x^1} = x\sqrt[6]{x}$$

If no assumption, we'd need $|x|\sqrt[6]{x}$

But x inside 6^{th} root says $x \geq 0$ OR $\sqrt[6]{x} \notin$ … $\sqrt[6]{x^7}$ NOT REAL.

§7.3 #s $\underbrace{1, 5, 9, \ldots, 73}_{\text{Every 4th}}$, 76, 81, 85, 89