

Mth112 | Wens 9-5-12

⑧
EX2
pg 295

$$3x^2 - 4x - 4 > 0$$

$$\text{sum} \Rightarrow -4$$

$$\text{prod} = -12$$

$$\quad \quad \quad \wedge$$

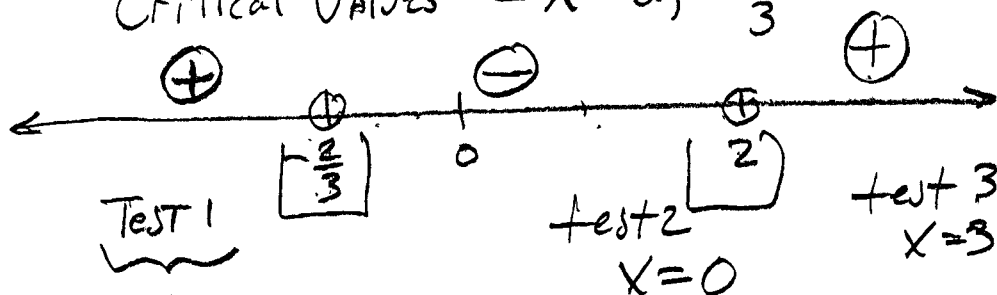
$$\quad \quad \quad +2 \quad -6$$

$$(3x^2 - 6x) + (2x - 4) > 0$$

$$3x(\underline{x-2}) + 2(\underline{x-2}) > 0$$

$$(x-2)(3x+2) > 0$$

$$\text{Critical Values} = x = 2, -\frac{2}{3}$$



$$x = -1$$

$$[-1-2][3(-1)+2] > 0$$

$$[-3][-1] > 0 \text{ True}$$

$$\text{test 2 } x = 0$$

$$(0-2)(3(0)+2) > 0$$

$$(-2)(2) > 0$$

$$\text{FALSE}$$

$$x = 3$$

$$(3-2)(3(3)+2) > 0$$

$$(1)(11) > 0 \text{ TRUE } \oplus$$

$$\left\{ x \mid x < -\frac{2}{3} \text{ or } x > 2 \right\}$$

NOTE

$$\cup = \text{UNION} = \text{OR}$$

$$\cap = \text{INTERSECTION} = \text{AND}$$

$$(-\infty, -\frac{2}{3}) \cup (2, +\infty)$$

$$\textcircled{9.} \quad \frac{z}{(z-5)} \geq 3$$

Critical Points $\Rightarrow$ ① Solution to the eq. if you replace $\geq$ with " $=$ "
 ② Values of z which make denom. zero.

First CP $\Rightarrow$

$$\frac{z}{z-5} = 3$$

$$\therefore z = (z-5)3$$

$$z = 3z - 15$$

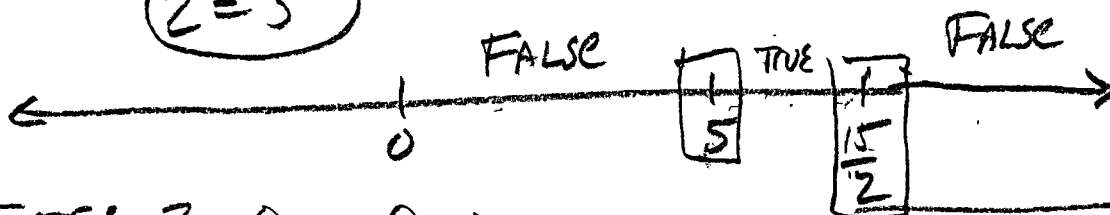
$$15 = 2z$$

$$\frac{15}{2} = z$$

Second

$$z-5=0$$

$$z=5$$



TESTS: $z=0$ $\frac{0}{0-5} \geq 3$ FALSE

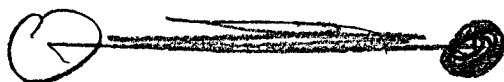
$z=6$ $\frac{6}{6-5} \geq 3$ TRUE

$z=8$ $\frac{8}{8-5} \geq 3$

$\frac{8}{3} \geq 3$ FALSE

$$\left\{ z \mid 5 < z \leq \frac{15}{2} \right\}$$

$$z = \left(5, \frac{15}{2} \right]$$



⑩
 9X
 Pg 299

$$\frac{X}{X+3} \leq 2$$

Crit. Points

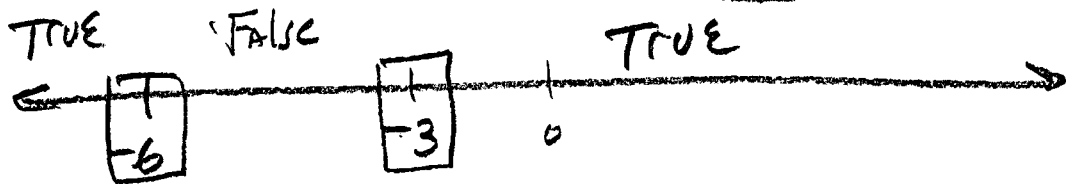
$$\frac{X}{X+3} = 2$$

$$X = 2X + 6$$

$$\textcircled{-6 = X}$$

$$X + 3 = 0$$

$$\textcircled{X = -3}$$



$$X = -7 \quad \frac{-7}{-7+3} \leq 2; \quad \frac{-7}{-4} \leq 2 \text{ TRUE}$$

$$X = -4 \quad \frac{-4}{-4+3} \leq 2; \quad \frac{-4}{-1} \leq 2 \text{ FALSE}$$

$$X = 0 \quad \frac{0}{0+3} \leq 2 \text{ TRUE}$$

$$\boxed{\{X \leq -6 \text{ OR } X > -3\}}$$

$$\boxed{(-\infty, -6] \cup (-3, +\infty)}$$

EXTRA NOTES

Pg 292
(16)

$$(N^2+1) + \sqrt{N^2+1} = 20$$

$$\text{Let } u = \sqrt{N^2+1}$$

$$u^2 + u - 20 = 0$$

$$\text{sum} = 1$$

$$\text{prod} = -20$$

$$\begin{array}{c} 1 \backslash \\ -4 \quad +5 \end{array}$$

$$(u-4)(u+5) = 0$$

$$u = 4$$

$$\sqrt{N^2+1} = 4$$

$$N^2+1 = 16$$

$$N^2 = 15$$

$$N = \pm\sqrt{15}$$

$$\text{CK} = 20$$

$$(\sqrt{15})^2 + 1 + \sqrt{(\sqrt{15})^2 + 1}$$

$$15 + 1 + 4 = 20 \checkmark$$

$$u = -5$$

$$\sqrt{N^2+1} = -5$$

$$N^2+1 = 25$$

$$N^2 = 24$$

$$N = \pm 2\sqrt{6}$$

$$(\sqrt{24})^2 + 1 + \sqrt{(\sqrt{24})^2 + 1}$$

$$24 + 1 + 5 \neq 20$$

FALSE

$$N = \{-\sqrt{15}, \sqrt{15}\}$$

Pg 292
 (21) $5p^{\frac{2}{3}} + 11p^{\frac{1}{3}} + 2 = 0$

Let $u = p^{\frac{1}{3}}$

$$5u^2 + 11u + 2 = 0$$

Sum = 11

prod = 10

+1 +10

$$(5u^2 + 10u) + (1u + 2) = 0$$

$$5u(u + 2) + 1(u + 2) = 0$$

$$(u + 2)(5u + 1) = 0$$

$$u = -2$$

$$p^{\frac{1}{3}} = -2$$

$$(p^{\frac{1}{3}})^3 = (-2)^3$$

$$p = -8$$

OK
 $\frac{2}{3} = -2$

$$5(-8)^{\frac{2}{3}} + 11(-8)^{\frac{1}{3}}$$

$$5(4) + 11(-2)$$

$$20 - 22 = -2 \checkmark$$

$$u = -\frac{1}{5}$$

$$(p^{\frac{1}{3}})^3 = \left(-\frac{1}{5}\right)^3$$

$$p = -\frac{1}{125}$$

$$\checkmark \quad 5\left(-\frac{1}{125}\right)^{\frac{2}{3}} + 11\left(-\frac{1}{125}\right)^{\frac{1}{3}}$$

$$5\left(-\frac{1}{5}\right)^2 + 11\left(-\frac{1}{5}\right)$$

$$5\left(\frac{1}{25}\right) - \frac{11}{5}$$

$$\frac{1}{5} - \frac{11}{5} = -2 \checkmark$$

$$p = \left\{-8, -\frac{1}{125}\right\}$$

Pg 292
(22)

$$u^{\frac{3}{2}} - 7u^{\frac{3}{4}} - 8 = 0$$

EXTRA
NOTES

$$\text{Let } z = u^{\frac{3}{4}}$$

$$z^2 - 7z - 8 = 0$$

$$\text{sum} = -7$$

$$\text{prod} = -8$$

$$\begin{array}{r} 1 \\ +1 \end{array} -8$$

$$(z+1)(z-8) = 0$$

$$z = -1$$

$$u^{\frac{3}{4}} = -1$$

$$(u^{\frac{3}{4}})^{\frac{4}{3}} = (-1)^{\frac{4}{3}}$$

$$u = (\sqrt[3]{-1})^4$$

$$u = (-1)^4$$

$$u = 1$$

$$z = 8$$

$$u^{\frac{3}{4}} = 8$$

$$(u^{\frac{3}{4}})^{\frac{4}{3}} = 8^{\frac{4}{3}}$$

$$u = 16$$

CK

$$16^{\frac{3}{2}} - 7(16)^{\frac{3}{4}}$$

$$64 - 56 - 8 = 0$$

True

CK

$$(1)^{\frac{3}{2}} - 7(1)^{\frac{3}{4}}$$

$$1 - 7 - 8 \neq 0$$

False

$$\therefore u = \{16\}$$

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(19)

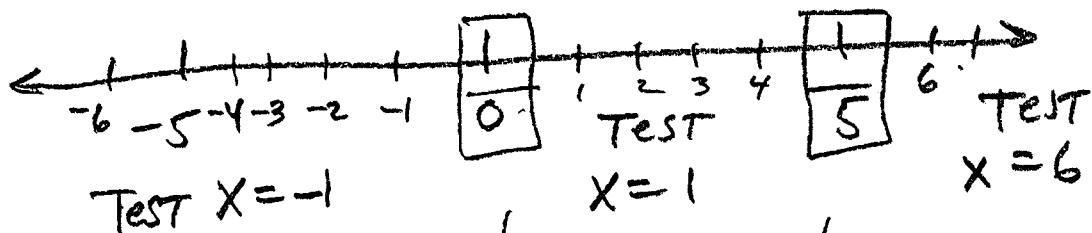
$$x^2 - 5x < 0$$

EXTRA NOTES

8

Critical Points

$$x(x-5) = 0 \quad x = 0, 5$$



$$(-1)^2 - 5(-1) < 0$$

$$1 + 5 < 0$$

FALSE

(+)

$$(1)^2 - 5(1) < 0$$

$$1 - 5 < 0$$

TRUE

(-)

$$(6)^2 - 5(6) < 0$$

$$36 - 30 < 0$$

FALSE

(+)

$$x = \{x \mid 0 < x < 5\}$$

SET BUILDER NOTATION

$$x = (0, 5)$$

INTERVAL NOTATION