Exercise 7.2

Q1) Identify the following statements as true or

(i)	$\|x\| = 0$ has only one solution	True
(ii)	All absolute value equations have two solutions	False
(iii)	The equation $\|x\| = 2$ is equivalent to $x = 2$ *or* $x = -2$	True
(iv)	The equation $\|x-4\| = -4$ has no solution	True
(v)	The equation $\|2x-3\| = 5$ is equivalent to $2x - 3 = 5$ *or* $2x + 3 = 5$	False

Q2)

(i) $|3x-5|=4$

Solution $|3x-5|=4$

$3x-5 = \pm 4$

$3x-5=4$ | $3x-5=-4$

$3x=4+5$ | $3x=-4+5$

$3x=9$ | $3x=1$

$x=\frac{9}{3}$ | $x=\frac{1}{3}$

$x=3$

To check | To check

$x=3$ | $x=\frac{1}{3}$

$|3(3)-5|=4$ | $\left|3\times\frac{1}{3}-5\right|=4$

$|9-5|=4$ | $|1-5|=4$

$4=4$ | $|-4|=4$

$4=4$

Solution Set $=\left\{3,\frac{1}{3}\right\}$

(ii) $\frac{1}{2}|3x+2|-4=11$

Solution $\frac{1}{2}|3x+2|-4=11$

$\frac{1}{2}|3x+2|-4=11$

$\frac{1}{2}|3x+2|=11+4$

$\frac{1}{2}|3x+2|=15$

$|3x+2|=2\times 15$

$|3x+2|=30$

$3x+2=\pm 30$

$3x+2=30$ | $3x+2=-30$

$3x=30-2$ | $3x=-30-2$

$3x=28$ | $3x=-32$

$x=\frac{28}{3}$ | $x=\frac{-32}{3}$

Check

$\frac{1}{2}|3x+2|-4=11$ | $\frac{1}{2}\left|3\times\frac{-32}{3}+2\right|-4=11$

$\frac{1}{2}|3\times\frac{28}{3}+2|-4=11$ | $\frac{1}{2}|-32+2|-4=11$

$\frac{1}{2}|28+2|-4=11$ | $\frac{1}{2}|-30|-4=11$

$\frac{1}{2}\times 30-4=11$ | $\frac{1}{2}(30)-4=11$

$15-4=11$ | $15-4=11$

$11=11$ | $11=11$

Solution Set $=\left\{\frac{28}{3},\frac{-32}{3}\right\}$

(iii) $|2x+5|=11$

Solution $|2x+5|=11$

$2x+5=\pm 11$

$2x+5=11$ | $2x+5=-11$

$2x=11-5$ | $2x=-11-5$

$2x=6$ | $2x=-16$

$x=\frac{6}{2}$ | $x=\frac{-16}{2}$

$x=3$ | $x=-8$

To check

$|2x+5|=11$ | $|2(-8)-8+5|=11$

$|2\times3+5|=11$ | $|-16+5|=11$

$6+5=11$ | $|-11|=11$

$11=11$ | $11=11$

Solution Set $=\{-8,3\}$

(iv) $|3+2x|=|6x-7|$

Solution $|3+2x|=|6x-7|$

$3+2x=\pm(6x-7)$

$3+2x=6x-7$ | $3+2x=-(6x-7)$

$3+7=6x-7$ | $3+2x=-6x+7$

$10=4x$ | $2x+6x=7-3$

$\frac{10}{4}=x$ | $\frac{4}{8}=x$

$x=\frac{5}{2}$ | $x=\frac{1}{2}$

To check

$|3+2x|=|6x-7|$ | $|3+2x|=|6x-7|$

$\left|3+2\left(\frac{5}{2}\right)\right|=\left|6^{3}\left(\frac{5}{\cancel{2}}\right)-7\right|$

$\left|3+2\times\frac{1}{2}\right|=\left|6^{3}\times\frac{1}{\cancel{2}}-7\right|$

$|3+5|=|15-7|$ | $|3+1|=|3-7|$

$|8|=|8|$ | $|4|=|-4|$

$8=8$ | $4=4$

Solution Set $=\left\{\frac{5}{2},\frac{1}{2}\right\}$

(v) $|x+2|-3=5-|x+2|$

Solution $|x+2|-3=5-|x+2|$

$|x+2|+|x+2|=5+3$

$2|x+2|=8$

$|x+2|=\frac{8}{2}$

$|x+2|=4$

$x+2=\pm4$

$x+2=4$ | $x+2=-4$

$x=4-2$ | $x=-4-2$

$x=2$ | $x=-6$

To check

$|x+2|-3=5-|x+2|$ | $|x+2|-3=5-|x+2|$

$|2+2|-3=5-|2+2|$ | $|-6+2|-3=5-|-6+2|$

$14-3=5-|4|$ | $|-4|-3=5-|-4|$

$4-3=5-4$ | $4-3=5-4$

$1=1$ | $1=1$

Solution Set $=\{-6,2\}$

(vi) $\frac{1}{2}|x+3|+21=9$

Solution $\frac{1}{2}|x+3|+21=9$

$\frac{1}{2}|x+3|=9-21$

$\frac{1}{2}|x+3|=-12$

$|x+3|=-12\times2$

$|x+3|=-24$

Value of absolute in never negative so solution is not possible

Solution Set $=\{\ \}$

(vii) $\left|\frac{3-5x}{4}\right|-\frac{1}{3}=\frac{2}{3}$

Solution $\left|\frac{3-5x}{4}\right|-\frac{1}{3}=\frac{2}{3}$

$\left|\frac{3-5x}{4}\right|=\frac{2}{3}+\frac{1}{3}$

$\left|\frac{3-5x}{4}\right|=\frac{2+1}{3}$

$\left|\frac{3-5x}{4}\right|=\frac{3}{3}$

$\left|\frac{3-5x}{4}\right|=1$

$\frac{3-5x}{4}=\pm1$

$\frac{3-5x}{4}=1$ and $\frac{3-5x}{4}=-1$

$3-5x=4$ | $3-5x=-4$

$-5x=4-3$ | $-5x=-4-3$

$-5x=1$ | $-5x=-7$

$x=\frac{1}{-5}$ $\quad$ $x=\frac{-7}{-5}$

$x=-\frac{1}{5}$ $\quad$ $x=\frac{7}{5}$

$\left|\frac{3-5\times\left(-\frac{1}{5}\right)}{4}\right|-\frac{1}{3}=\frac{2}{3}$ $\quad$ $\left|\frac{3-5\times\left(+\frac{7}{5}\right)}{4}\right|-\frac{1}{3}=\frac{2}{3}$

$\left|\frac{3+1}{4}\right|-\frac{1}{3}=\frac{2}{3}$ $\quad$ $\left|\frac{3-7}{4}\right|-\frac{1}{3}=\frac{2}{3}$

$\left|\frac{4}{4}\right|-\frac{1}{3}=\frac{2}{3}$ $\quad$ $\left|\frac{-4}{4}\right|-\frac{1}{3}=\frac{2}{3}$

$\left|-1\right|-\frac{1}{3}=\frac{2}{3}$

$1-\frac{1}{3}=\frac{2}{3}$ $\quad$ $1-\frac{1}{3}=\frac{2}{3}$

$\frac{3-1}{3}=\frac{2}{3}$ $\quad$ $\frac{3-1}{3}=\frac{2}{3}$

$\frac{2}{3}=\frac{2}{3}$ $\quad$ $\frac{2}{3}=\frac{2}{3}$

Solution Set $=\left\{\frac{-1}{5},\frac{7}{5}\right\}$

(viii) $\left|\frac{x+5}{2-x}\right|=6$

Solution $\left|\frac{x+5}{2-x}\right|=6$

$\frac{x+5}{2-x}=\pm 6$

$\frac{x+5}{2-x}=6$

$x+5=6(2-x)$

$x+5=12-6x$

$x+6x=12-5$

$7x=7$

$x=\frac{7}{7}$

$x=1$

$\frac{x+5}{2-x}=-6$

$x+5=-6(2-x)$

$x+5=-12+6x$

$5+12=6x-x$

$17=5x$

$\frac{17}{5}=x$

$x=\frac{17}{5}$

To check

$\left|\frac{x+5}{2-x}\right|=6$

$\left|\frac{1+5}{2-1}\right|=6$

$\left|\frac{6}{1}\right|=6$

$6=6$

$\left|\left(\frac{17}{5}+5\right)\div\left(2-\frac{17}{5}\right)\right|=6$

$\left|\frac{17+25}{5}\div\frac{10-17}{5}\right|=6$

$\left|\frac{42}{5}\div\frac{-7}{5}\right|=6$

$|-6|=6$

$6=6$

Solution Set $=\left\{1,\frac{17}{5}\right\}$

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Report any mistake at freeilm786@gmail.com