

While you may use your calculator, you MUST Show ALL Work for Full Credit!

In Problems 1 - 2, convert the decimal to a simplified fraction (improper fraction, if applicable).

1.) 0.45 [ 3 Points ]

$$= \frac{45}{100} = \frac{9}{20}$$

2.) 1.82727272727 [ 4 Points ]

$$\begin{aligned} 100x &= 182.\overline{727272} \\ - \quad x &= 1.\overline{827272} \\ \hline 99x &= 180.9 \\ 990x &= 1809 \\ x &= \frac{1809}{990} \end{aligned}$$

$$\boxed{x = \frac{201}{110}}$$

In Problems 3 - 4, evaluate the expression.

[ 6 Points Each ]

Write the answer as a simplified improper fraction, if applicable.  
 SHOW EACH STEP IN THE CORRECT ORDER!

3.)  $\left[ 2 + \left( \frac{1}{2} \right)^2 \right]^{-2} - 4$

$$\begin{aligned} &= \left[ 2 + \frac{1}{4} \right]^{-2} - 4 \\ &= \left[ \frac{9}{4} \right]^{-2} - 4 \\ &= \left[ \frac{4}{9} \right]^2 - 4 \\ &= \frac{16}{81} - 4 \\ &= \frac{-308}{81} \end{aligned}$$

4.)  $\left[ \frac{(3-5)^2 \cdot 12 \div 6 - 2 \cdot 5}{18 \div 9 - 3 \cdot 4} \right]^2$

$$\begin{aligned} &= \left[ \frac{(-2)^2 \cdot 12 \div 6 - 2 \cdot 5}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{4 \cdot 12 \div 6 - 2 \cdot 5}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{48 \div 6 - 2 \cdot 5}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{8 - 2 \cdot 5}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{8 - 10}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{-2}{18 \div 9 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{-2}{2 - 3 \cdot 4} \right]^2 \\ &= \left[ \frac{-2}{2 - 12} \right]^2 \\ &= \left[ \frac{-2}{-10} \right]^2 \\ &= \left[ \frac{1}{5} \right]^2 \\ &= \frac{1}{25} \end{aligned}$$

5.) Simplify completely:

$64^{1/3}$

[ 3 Points ]

$$= \sqrt[3]{64} = \boxed{4}$$

Since  $4 \cdot 4 \cdot 4 = 64$

In Problems 6 – 11. solve the equation for all applicable answers.  
Write answers in simplified form.

[ 6 Points Each ]

$$6.) 20\left(\frac{2}{5}x - \frac{7}{4}\right) = \left(\frac{3}{10} - x\right)20$$

$$8x - 35 = 6 - 20x$$

$$28x = 41$$

$$\boxed{x = \frac{41}{28}}$$

$$7.) \left(\frac{2}{3}\right)\left(\frac{7}{2}x - 6\right) - \frac{8}{3} = 2x - \frac{7}{6}$$

$$6\left(\frac{7}{3}x - 4 - \frac{8}{3}\right) = \left(2x - \frac{7}{6}\right)6$$

$$14x - 24 - 16 = 12x - 7$$

$$14x - 40 = 12x - 7$$

$$2x = 33$$

$$\boxed{x = \frac{33}{2}}$$

$$8.) 5\sqrt{24}x - 7 = 5 - \sqrt{54}x$$

$$5\sqrt{4}\sqrt{6}x - 7 = 5 - \sqrt{9}\sqrt{6}x$$

$$10\sqrt{6}x - 7 = 5 - 3\sqrt{6}x$$

$$13\sqrt{6}x = 12$$

$$x = \frac{12}{13\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$$

$$x = \frac{12\sqrt{6}}{13(6)}$$

$$\boxed{x = \frac{2\sqrt{6}}{13}}$$

$$9.) 3x - 5\sqrt{12} = -\frac{x}{2} + \sqrt{27}$$

$$3x - 5\sqrt{4}\sqrt{3} = -\frac{x}{2} + \sqrt{9}\sqrt{3}$$

$$2(3x - 10\sqrt{3}) = \left(-\frac{x}{2} + 3\sqrt{3}\right)2$$

$$6x - 20\sqrt{3} = -x + 6\sqrt{3}$$

$$7x = 26\sqrt{3}$$

$$\boxed{x = \frac{26\sqrt{3}}{7}}$$

10.)  $2|x-4|+5x=11x-8$

$$2|x-4|=6x-8$$

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

$$\downarrow$$

$$x-4=3x-4$$

$$0=2x$$

No!  $0=x$

Doesn't check

$x=2$  only

}

or

$$x-4=-(3x-4)$$

$$x-4=-3x+4$$

$$4x=8$$

$x=2$

yes!

11.)  $\left| \frac{\sqrt{8}}{3}x-10 \right| = \left| \frac{\sqrt{18}}{2}x-1 \right|$

↙

$$\frac{\sqrt{8}}{3}x-10 = \frac{\sqrt{18}}{2}x-1$$

$$\frac{2\sqrt{2}}{3}x-10 = \frac{3\sqrt{2}}{2}x-1$$

$$6\left(\frac{2\sqrt{2}}{3}x-10\right) = 6\left(\frac{3\sqrt{2}}{2}x-1\right)$$

$$4\sqrt{2}x-60 = 9\sqrt{2}x-6$$

$$-54 = 5\sqrt{2}x$$

$$x = \frac{-54}{5\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{-54\sqrt{2}}{10}$$

yes!  
checks

$x = \frac{-27\sqrt{2}}{5}$

↘

or

$$\frac{\sqrt{8}}{3}x-10 = -\left(\frac{\sqrt{18}}{2}x-1\right)$$

$$6\left(\frac{2\sqrt{2}}{3}x-10\right) = 6\left(-\frac{3\sqrt{2}}{2}x+1\right)$$

$$4\sqrt{2}x-60 = -9\sqrt{2}x+6$$

$$13\sqrt{2}x = 66$$

$$x = \frac{66}{13\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{66\sqrt{2}}{26}$$

$x = \frac{33\sqrt{2}}{13}$

12.)

$$\sqrt{x+7} - \sqrt{x+1} = 2$$

[ 12 Points ]

$$(\sqrt{x+7})^2 = (2 + \sqrt{x+1})^2$$

$$x+7 = (2 + \sqrt{x+1})(2 + \sqrt{x+1})$$

$$x+7 = 4 + 2\sqrt{x+1} + 2\sqrt{x+1} + x+1$$

$$x+7 = x+5 + 4\sqrt{x+1}$$

$$2 = 4\sqrt{x+1}$$

$$\frac{2}{4} = \sqrt{x+1}$$

$$\left(\frac{1}{2}\right)^2 = (\sqrt{x+1})^2$$

$$\frac{1}{4} = x+1$$

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

BONUS

Solve for x. Leave your answer in exact form (no decimals).

[ 3 Points ]

$$\sqrt{2x-1} + x = 1$$

$$(\sqrt{2x-1})^2 = (1-x)^2$$

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

$$2x-1 = 1-x-x+x^2$$

$$2x-1 = 1-2x+x^2$$

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

Quadratic Formula (Bonus)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$x = \frac{4 \pm \sqrt{16-8}}{2}$$

$$x = \frac{4 \pm \sqrt{8}}{2}$$

$$x = \frac{4 \pm 2\sqrt{2}}{2}$$

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

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

↑ doesn't check

$$\boxed{x = 2 - \sqrt{2}}$$

← checks!