Announcements

1. Earn 94 Mastery Points by Saturday at 2:00 pm
2. Earn an 80% score (or better) on the remediation test in MyMathLab by April 11th at 11:59 pm

Finish 5.7.6 - Radical Equations and Problem Solving (pp. 119)
All of 5.7.7 - Complex Numbers (pp 120-123)

5 days until the Chapter 7 Test!
To study, complete the ch. 7 review problems over and over until you can do each one correctly, quickly, confidently, with no help, and with the ability to explain why each problem is solved that way.

Solve:
\[
\sqrt{y+5} = 1 - \sqrt{y-1}
\]

Steps:
1) Isolate
2) Raise
3) Solve
4) Check

1) Isolate
\[
\sqrt{y+5} = 1 - \sqrt{y-1}
\]

2) Raise
\[
(\sqrt{y+5})^2 = (1 - \sqrt{y-1})^2
\]
\[
y+5 = 1 - 2\sqrt{y-1} + (y-1)
\]
\[
y+5 = 2\sqrt{y-1} + y - 1
\]

1) Isolate again (because we still have a radical in our equation)
Announcements

1. Earn 14 Mastery Points by Saturday 3/30 at 3:00 pm

2. Earn an 80% score (or better) on the remediation test in My Math Lab by April 1st at 11:59 pm

Finish 5.6 - Radical Equations and Problem Solving (pp 119)
All of 5.7 - Complex Numbers (pp 120-123)

5 days until the Chapter 7 Test!
To study, complete the ch. 7 review problems over and over until you can do each one correctly, quickly, confidently, with no help, and with the ability to explain why each problem is solved that way.

Solve:

\[ 7.6.19 \quad \sqrt{y+5} = 1 - \sqrt{y-1} \]

Steps:
1) Isolate
2) Raise
3) Solve
4) Check

1) Isolate: 7

\[ \sqrt{y+5} = 1 - \sqrt{y-1} \]

2) Raise:

\[ (\sqrt{y+5})^2 = (1 - \sqrt{y-1})^2 \]

\[ y+5 = 1 - 2\sqrt{(y-1)} + (y-1) \]

\[ y+5 = 1 - 2\sqrt{y-1} + y - 1 \]

1) Isolate again (because we still have a radical in our equation)
\[ y + 5 = \frac{1}{y} - 2(y - 1) + \frac{y - 1}{y} \]

\[ 5 = -2(y - 1) \]

2) Raise:

\[ (5)^2 = (-2(y - 1))^2 \]

\[ a^2 b^2 \]

3) Solve:

\[ 25 = 4(y - 1) \]

\[ 25 = 4y - 4 \]

\[ 4y = 29 \]

\[ y = \frac{29}{4} \]

4) Check:

\[ \sqrt{y + 5} = 1 - \sqrt{y - 1} \]

\[ \sqrt{\frac{29}{4} + 5} = 1 - \sqrt{\frac{29}{4} - 1} \]

\[ \sqrt{\frac{29 + 20}{4}} = 1 - \sqrt{\frac{29 - 4}{4}} \]

\[ \sqrt{\frac{49}{4}} = 1 - \sqrt{\frac{25}{4}} \]

\[ \sqrt{\frac{49}{4}} = 1 - \sqrt{\frac{25}{4}} \]

\[ \frac{7}{2} = 1 - \frac{5}{2} \]

\[ \frac{7}{2} = \frac{2 - 5}{2} \]
So, \( y = \frac{29}{4} \) is not a solution.

Final Answer: No Solution

7.6.17) Solve:

\[ x - \sqrt{6 - 5x} = -1.2 \]

1) Isolate:

\[ x - \sqrt{6 - 5x} = -1.2 \]

\[ x + 1.2 = \sqrt{6 - 5x} \]

2) Raise:

\[ (x + 1.2)^2 = (\sqrt{6 - 5x})^2 \]

"a^2 + 2ab + b^2"

\[ x^2 + 2(1.2)x + 1.44 = 6 - 5x \]

3) Solve:

\[ x^2 + 2.4x + 1.44 = 6 - 5x \]

\[ x^2 + 7.4x + 1.44 = 6 - 5x \]

\[ + 5x \quad + 5x \]

\[ x^2 + 2.4x + 1.44 = 6 \]

\[ x = -6 \quad -6 \]

\[ x^2 + 2.4x + 1.44 = 0 \]

\[ (x + 6)(x + 23) = 0 \]

\[ x + 6 = 0, \quad x + 23 = 0 \]

\[ x = -6, \quad \lambda = -23 \]
4) Check:

Check \( x = -6 \)

\[
\begin{align*}
x - \sqrt{6 - 5x} &= -12 \\
-6 - \sqrt{6 - 5(6)} &= -12 \\
-6 - \sqrt{6 + 30} &= -12 \\
-6 - \sqrt{36} &= -12 \\
-6 - 6 &= -12 \\
-12 &= -12 \quad \checkmark
\end{align*}
\]

\( x = -6 \) is a final answer.

Check \( x = -23 \)

\[
\begin{align*}
x - \sqrt{6 - 5x} &= -12 \\
-23 - \sqrt{6 - 5(-23)} &= -12 \\
-23 - \sqrt{6 + 115} &= -12 \\
-23 - 11 &= -12 \\
-34 &= -12
\end{align*}
\]

So, \( x = -23 \) is not a solution.

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Pythagorean Theorem

\[ a^2 + b^2 = c^2 \]

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Ladder = hypotenuse in this problem \( c \)

\[
\begin{align*}
a^2 + b^2 &= c^2 \\
18^2 + 24^2 &= c^2 \\
324 + 576 &= c^2 \\
900 &= c^2 \\
900 &= 900 \\
(c + 30) (c - 30) &= 0
\end{align*}
\]
\[(c+30) \cdot (c-30) = 0\]
\[c+30 = 0 \quad c-30 = 0\]
\[c = -30 \quad c = 30 \rightarrow \text{We can't consider a negative number for distance in real world.}\]

So, the answer is:
we need a 30-feet ladder.

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### Complex Numbers

Imaginary Unit:
\[
\left|\frac{1}{i}\right| = 1
\]
\[
\left|\frac{1}{i} = i\right|
\]

\[
\sqrt[3]{2} = \sqrt[3]{1.\overline{3}} = i \cdot \sqrt[3]{2}
\]

so: \(\sqrt[3]{2} = i \cdot \sqrt[3]{2}\)

---

Obs: When we're dividing or multiplying square roots of negative numbers, first, we must write each number in terms of the imaginary unit \(i\).

We must follow this step first when a negative shows up in one or both of the radicals.

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\(9.7.19\) Multiply

\[
\sqrt[3]{-3} \cdot \sqrt[6]{2} \rightarrow \text{We cannot use the product rule first because we have}\]
\[
i \cdot \sqrt[3]{2} \cdot i \cdot \sqrt[6]{2}
\]
\[
i \cdot i \cdot \sqrt[3]{2} \cdot \sqrt[6]{2}
\]
\[
i^2 \cdot \sqrt[3]{2} \cdot \sqrt[6]{2}
\]
\[
\rightarrow \text{Now we use the product rule}
\]
\[
\frac{1^2 \cdot \sqrt{3.6}}{1^2 \cdot \sqrt{3.3}} = \frac{1^2}{1^2} \cdot \frac{\sqrt{3.6}}{\sqrt{3.3}} = \frac{\sqrt{3.6}}{\sqrt{3.3}} = \frac{\sqrt{1.3}}{1.3^{\frac{1}{2}}} = \frac{1.3}{1.3} = 1 \cdot \frac{\sqrt{1.3}}{1.3} = \frac{\sqrt{1.3}}{1.3}
\]

Final answer

3.3.25) Divide

\[
\frac{\sqrt{90}}{\sqrt{5}} = \sqrt{\frac{90}{5}} = \sqrt{18} = \sqrt{9 \cdot 2} = 3\sqrt{2}
\]

Add, Subtract, and Multiply Complex Numbers

We do this the same way we do it for polynomials, except that \(i^2 = -1\)
\[7.3.1 \quad (3 + 7i) - (9 - 7i) + (2 + 6i) - (3 + 6i)^2\]

\[= \quad (3 + 7i - 9 + 7i + 2 + 6i + 27 + 36i)\]

\[= \quad 123 + 56i\]

Final answer:

\[\boxed{123 + 56i}\]

This is the proper form to write with imaginary unit

\[(i) \text{ is not allowed to be in a fraction}\]

**Divide Complex Numbers**

- Identify the conjugate of the denominator
- Multiply top and bottom by the conjugate of the denominator

\[\boxed{7.3.4.2 \quad \frac{8 - 1i}{5 - 2i} \quad \text{division complex numbers}}\]

\[= \quad \frac{(8 - 1i) \cdot (5 + 2i)}{(5 - 2i) \cdot (5 + 2i)}\]

\[= \quad \frac{40 + 16i - 5i - 2i^2}{25 + 10i - 10i - 4i^2}\]

\[= \quad \frac{40 + 11i}{25 - 4i^2}\]

\[= \quad \frac{40 + 11i}{25 - 4(-1)}\]

\[= \quad \frac{40 + 11i}{25 + 4}\]

\[\Rightarrow \quad \frac{40 + 11i - 2(-1)}{25 - 4(-1)} = \frac{40 + 11i + 2}{25 + 4}\]

\[\Rightarrow \quad \frac{\boxed{42 + 11i}}{29}\]

\[\boxed{\frac{42 + 11i}{29}}\]

\[\Rightarrow \quad \boxed{\frac{a + bi}{a^2 + b^2}}\]

\[c \text{ is not allowed to be in a fraction}\]
Divide:

\[ \frac{2}{i} \cdot \frac{(-i)}{(-i)} = \frac{-2i}{-1} = 2i = \frac{2i}{1} \]

\[ = |-2i| \]

(in this case, \(a\) is zero, so this format is acceptable as a final answer)

**Raise to \(i\) Powers**

The wheel of \(i\):}

\[ \text{Ex: } i^{12} = i \]

\[ i - 6 = i \]
23

\[ i^2 = -1 \]
\[ i^0 = 1 \]
\[ i^{24} = -1 \]

--- Solve for \( x \). ---

\[ x - \sqrt{x+13} = -1 \]

1) \underline{Isolate}:

\[
\begin{align*}
\quad x + 1 &= \sqrt{x+13} \\
\quad (x+1)^2 &= (\sqrt{x+13})^2 \\
\quad x^2 + 2x + 1 &= x + 13 \\
\quad x^2 + 2x + 1 &= x + 13
\end{align*}
\]

\[ (x+1)(x+1) = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]

2) \underline{Raise}:

\[ (x+1)^2 = (\sqrt{x+13})^2 \]
\[ (x+1)(x+1) = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]

\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]

\[ x + 1 = \sqrt{x + 13} \]

3) \underline{Solve}:

\[ (x+1)(x+1) = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]
\[ x^2 + 2x + 1 = x + 13 \]

\[ x + 1 = \sqrt{x + 13} \]

4) \underline{Check}:

- Check \( x = -4 \)

\[ x - \sqrt{x+13} = -1 \]
\[ -4 - \sqrt{-4+13} = -1 \]
\[ -4 - \sqrt{9} = -1 \]
\[ -4 - 3 = -1 \]
[Not a solution]

So, \( x = -4 \) is not a solution.

- Check \( x = 3 \)

\[ 3 - \sqrt{3+13} = -1 \]
\[ 3 - \sqrt{16} = -1 \]
\[ 3 - 4 = -1 \]
\[ -1 = -1 \]

So, the solution is \( x = 3 \).