Pre Calc 11 - Chp 2.1

Note Title 2015-07-04

Absolute Value - is a function. In simplest terms, absolute value changes negative numbers into positive ones. In physics, we deal with real numbers such as displacement and velocity; but we also have only positive value quantities such as distance and speed. So, we never have negative distance but we do have negative displacement. A synonym for absolute value is

eg) The displacement of the spring is -5 cm. What is the magnitude?

eg) The car's velocity is 25 km/h. What is the speed?

eg) The temperature went from $10°C$ to $5°C$? What is the absolute value of the temperature change?

Because absolute value is used frequently, we have a shortcut for abs(x) which is $|x|$.

eg) $|4.2| =$ $\quad\quad\quad\quad$ $|-3.7| =$

The Principal Square Root is always positive. The confusion occurs when we have:

$x^2 = 49$ $\quad\quad$ but

So, $\sqrt{x^2} = |x|$ $\quad$ since

Evaluating absolute value expressions. Make sure that you still follow the rules of BEDMAS.

eg) Evaluate: $|3-7|(4-9) + |-2-5|(3+2)$

Solving absolute value equations. Remember that the parameter of absolute value can be positive or negative.

eg) $|x-3| = 7-2$

Hw: pp. 89-94: 1-7, 9, 11, 13ac, 14ac

Challenge: 15, 16

Please solve 10 in person

PreCalc 11 - Chp 2.2

Note Title 2015-07-04

Simplifying Radical Expressions. - recall that radicals are another way of writing exponents.

eg) $\sqrt{16} =$ $\sqrt[3]{-125} =$

$\sqrt[3]{64} =$

Since radicals are powers, we should recall the Power Laws:

$a^m \cdot a^n = a^{m+n}$ $\frac{a^m}{a^n} = a^{m-n}$ $(a^m)^n = a^{m \cdot n}$

$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ $(ab)^m = a^m b^m$ $\frac{1}{a^m} = a^{-m}$

Comparing Radicals (without a calculator)

This trick requires a common index.

eg) $3\sqrt{5}$, $2\sqrt{7}$, $4\sqrt{2}$, Find largest.

eg) $3\sqrt[5]{5}$, $2\sqrt[5]{7}$, $4\sqrt[5]{2}$

Mixed radical: $a\sqrt[m]{b}$

Entire radical: $\sqrt[m]{a}$

Use $a\sqrt[m]{b} = \sqrt[m]{a^m b}$ to convert between the two.

eg) Convert $\sqrt[3]{108}$ to a mixed radical.

eg) Convert $2\sqrt[4]{5}$ to an entire radical.

eg) Convert $\frac{2}{3}\sqrt{7}$ to an entire radical.

Determining the domain is always important to know what values are permitted. So the domain with odd indices are all reals, $\mathbb{R}$. However the domain with even indices for $\sqrt{x}$ is $x \geq 0$.

eg) $\sqrt[3]{a}$, $\sqrt[4]{c^2}$,

$\sqrt[4]{4b}$, $\sqrt{x-1}$,

HW: pp. 100-105: 1-8, 11, 13
Challenge: 14-16
Please show 12 in person

PreCalc 11 – Chp 2.3

Adding and Subtracting Radical Expressions – we simply do what we always do, group like-terms. It makes no difference if we are grouping variables or radicals.

eg) Simplify: $x^2 + xy - 4y^2 + 3xy - 2x^2 - 5y^2$

eg) Simplify: $5\sqrt{7} - 4\sqrt{3} + 7\sqrt{7} + 8\sqrt{3}$

It is best to simplify radicals first.

eg) Simplify: $\sqrt{50} - 2\sqrt{2} + \sqrt{27} - \sqrt{243}$

If there are variables, don't worry; it's easier to simplify without a calculator.

eg) Simplify: $\sqrt[3]{4a^6b^4c^5}$

There are harder problems that require you to simplify the radicals first.

eg) Simplify: $\sqrt{9x} + 5y\sqrt{2z} + 2\sqrt{x} - 7\sqrt{2y^2z}$

$|y|$ is needed when the index is even and the power of the variable is even; this is because any negative to an even power will become positive, so the radical will always be positive on the domain of all reals.

So, $\sqrt[m]{x^n} =$

With $(-8)^{4/3}$, does it matter if we take the power or the root first? Try it! What about $(-8)^{3/4}$

eg) $((-8)^4)^{1/3} =$

$((-8)^{1/3})^4 =$

eg) $((-8)^3)^{1/4} =$

$((-8)^{1/4})^3 =$

Usually, we are told to reduce fraction. Should we do this when they are the exponent? Try it!

eg) $(-8)^{2/6} =$

So, reduce fractions that are exponents.

HW: pp. 114-119: 1-5, 7-9
Challenge: 11-13
Please solve 6 in person

PreCalc 11 - Chp 2.4

Note Title 2015-07-05

Multiplying and Dividing Radical Expressions - we need to know that . We have seen this previously:

eg) $(3\sqrt{7}+5\sqrt{3})(2\sqrt{7}-4\sqrt{3})$ FOIL

Multiply conjugates (for a difference of squares)

eg) $(3\sqrt{7}+5\sqrt{3})(3\sqrt{7}-5\sqrt{3})$ FOIL

What about a binomial squared?

eg) $(3\sqrt{7}+5\sqrt{3})(3\sqrt{7}+5\sqrt{3})$ FOIL

If there are variables, just carry on as usual.

eg) $(4\sqrt{b}-3\sqrt{c})(6\sqrt{b}+2\sqrt{c})$

Let's try conjugates again.

eg) $(4\sqrt{b} - 3\sqrt{c})(4\sqrt{b} + 3\sqrt{c})$

When finalizing answers, you MUST:
Rationalizing the denominator - monomial case.
means no radicals in the denominator.

eg) $\dfrac{3\sqrt{3} - 4}{\sqrt{12}}$

Binomial case: multiply by conjugate of denominator.

eg) $\dfrac{6\sqrt{2} - 5\sqrt{3}}{3\sqrt{3} - 2\sqrt{5}}$

HW: pp. 126-133: 1-6, 9, 10, 12
Challenge: 13, 14
Please show 11 in person.

PreCalc 11 - Chp 2.5

Note Title 2015-07-05

Solving Radical Equations - solve as you do with regular algebra operations; isolate the radical & square both sides. The main difference is that you need to check for extraneous roots (roots that are not in the domain or do not fit in original equation.)

eg) $3\sqrt{2x} = 4$

eg) $6\sqrt{2x-1} + 3 = 7$

eg) $2\sqrt{2-3x} = 5$

eg) $\sqrt{-2x} = -3$

If there are radicals on both sides, just square both sides.

eg) $\sqrt{3x-5} = \sqrt{2x+4}$

eg) $\sqrt{2x+2} = \sqrt{x-10}$

HW: pp. 144 - 152: 1-5, 9, 10, 12
Challenge: 16, 17
Please show 14 in person.