Re: help with radical expressions

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rberlin@gmail.com (lauranalee) wrote in message
news:<c86f8f85.0410141101.1439e43a@posting.google.com>...
> I'm brushing up on my precalculus before going back to school and I'm
> having trouble with the Radical Expressions section. (I've had this
> in high school and College Algebra, but they went over it so quickly I
> never got a good understanding and that was about 8 yrs ago.) Anyway,
> I do fine till I get to a problem like (4x+5)^3/2 or (2x−1)^−1/2.

Generally you can't do anything with those. There's
no simple expression for the square root of a polynomial.
What you're probably looking for here is whether the same
base, (4x+5) for instance, occurs in the numerator and
the denominator, or occurs with different exponents
in a way that terms can be combined.

However, you should know how to "complete the square"
and recognize polynomials that are, or might be,
perfect squares. For instance (x+2)^2 = x^2 + 4x + 4,
so (x^2+4x+4) does have a square root.

> I
> came across this problem in my book and I'm lost. Can anybody help?
>
> It says to simplify the expression:
>
> (4x+5)^3/2(−1/2)*(2x−1)^−3/2*(2)−(2x−1)^−1/2*(3/2)*(4x+5)^1/2*(4)*
>
−−
> [(4x+5)^3/2]^2

OK, I see (4x+5) occurs in both terms in the numerator
(with different exponents) and is also in the denominator.
One thing to try might be to factor out the common factors
in the numerator. For instance, you could pull out
a (4x+5)^1/2 because

(4x+5)^(3/2) = (4x+5)^(1 + 1/2) = (4x+5)^(1/2) * (4x+5)^1

But that denominator is more tempting for simplification.
Why? Because I see a 1/2 power, and a power of 2. Those
cancel each other out.

[(4x+5)^(3/2)]^2 = (4x+5)^(2*3/2) = (4x+5)^3

Actually, I'll go ahead and do the factoring in the
numerator too. So I pull out a fraction that has
(4x+5)^(1/2) in the numerator and (4x+5)^3 in
the denominator, giving me:

[(4x+5)^(1/2)/(4x+5)^3] * [(4x+5)*(−1/2)*(2x−1)^−3/2*(2)−(2x−1)^−1/2*(3/2)*(4)]

I can do that division in the first term, getting
(4x+5)^(1/2 − 3) = (4x+5)*(−5/2)

Now let's look at the second thing. I see a (2x−1)
term in each. Again I can factor out a common term,
such as (2x−1)^(−1/2). While I'm at it, I'll notice
that (−1/2)*2 = −1 in the first term of the large
expression, and (3/2)*4 = 6 in the second term. So
I get:

(4x+5)*(−5/2)*(2x−1)^(−1/2)*[−(4x+5)*(2x−1)^(−1) − 6]

Now the thing in the brackets can be simplified by
noticing that (2x−1)^(−1) is the same as dividing by
(2x−1), so we have a fraction. We can combine the 6
with the fraction:

[−(4x+5)*(2x−1)^(−1) − 6] = [−(4x+5)/(2x−1) − 6]
  = [−(4x+5)−6*(2x−1)]/(2x−1)
  = [−4x − 5 − 12x + 6]/(2x−1)
  = [−16x + 1]/(2x−1)

>
> *To make it easy on you the answer I'm given in the back of the book*
> *is:*
>
> *−16x+1*
> *−−−−−−−−−−−−−−−−−−−−−−*
> *(4x+5)^5/2*(2x−1)^3/2*
>

I think you can see how to get from what I have to this
final answer.

Just to show you that there's more than one way to get
there, suppose instead of pulling out (2x−1)^(−1/2) in
the middle step I decided to pull out (2x−1)^(−3/2).

To do that, I write (2x−1)^(−1/2) = (2x−1)^(−3/2 + 1)
= (2x−1)^(−3/2) * (2x−1)^1

so I get

[(4x+5)*(−1/2)*(2x−1)^−3/2*(2)−(2x−1)^−1/2*(3/2)*(4)]

= [−(4x+5)*(2x−1)^−3/2 − (2x−1)^−1/2*6]

= (2x−1)^(−3/2)* [−(4x+5) − (2x−1)*6]

and this way I don't end up with a fraction to mess with.

= (2x−1)^(−3/2) * [−4x − 5 − 12x + 6]

− Randy