2.3 Hw Solutions

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Question 1:

a. We can solve this by using laws 1 and 3)

Solution: 😄

$$1 + 4 \cdot (-5)$$
$$= -19.$$

b.) We can solve this by using law no. 6

$$-5^3$$
$$= -125.$$

c.) Law no. 11

$$\sqrt{1}$$
$$= 1.$$

d.) Laws 3 and 5

$$\frac{5\,(1)}{-5}$$
$$= -1.$$

e.) Law no. 5

$$\frac{5}{0}$$
$$= DNE.$$

f.) Laws 4 and 5

$$\frac{5\,(0)}{1}$$
$$= 0.$$

Question 2:

Solution:

Plug in 12 for x:

$$8 - \frac{1}{3}(12)$$
$$= 4.$$

Question 3:

Solution:

If we plug in -3 into the denomonator, we get 0, so we must factor

$$\frac{x(x+3)}{(x-7)(x+3)}.$$

Cancel out common factors:

$$\frac{x}{x-7}.$$

Plug -3 into new equation:

$$\frac{-3}{-3-7}$$
$$= \frac{3}{10}.$$

Question 4:

Solution:

2 is not in the domain and the numerator cannot be factored, So DNE

Question 5:

Solution:

If we plug in -4 into the denomonator, we get 0, so we must factor the equation and simplify, we can factor the denomonator by using sum of squares.

Sum of Squares:

$$\left(a^3 + b^3\right) = (a+b)\left(a^2 - ab + b^2\right).$$

So the denomonator turns into:

$$(u+4)\left(u^2 - 4u + 16\right).$$

With this, we get the equation:

$$\frac{u+4}{(u+4)\left(u^2-4u+16\right)}.$$

now we can cancel out (u+4) and get the new equation:

$$\frac{1}{u^2-4u+16}.$$

with this equation, we can plug in -4 and get our limit:

So:

$$\frac{1}{(-4)^2-4(-4)+16}$$
$$=\frac{1}{48}.$$

Question 6:

Solution: 😄

We can see that if we plug in 0 to the denomonator, we get 0, Therefore it is not in the domain and we must factor and simplify.

If we distribute out the first portion of the numerator, we get

$$h^2-16h+64-64.$$

So alltogether we have:

$$\frac{h^2-16h}{h}.$$

Which can be further simplifed to:

$$\frac{h(h-16)}{h}.$$

Furthermore, we can cancel out the common factor h and we are left with:

$$h-16.$$

Now we can plug in 0 to this new equation and we are just left with our limit which is **-16**

Question 7:

Solution: 😄

First mulitply the numerator and denomonator by the conjugate.

$$\frac{2-x}{\sqrt{x+2}-2}\cdot\frac{\sqrt{x+2}+2}{\sqrt{x+2}+2}.$$

This gives us:

$$\frac{(2-x)\left(\sqrt{x+2}+2\right)}{x+2-4}.$$

The denomonator can be rewriten as:

$$\frac{(2-x)\left(\sqrt{x+2}+2\right)}{x-2}.$$

Now we want to cancel out the common terms of x-2, but first we need to **algebriacly rewrite 2-x as x-2**

$$\begin{aligned} & 2-x \\ &= -1\left(-2\right)-x \\ \text{turn 2 into } & -1\cdot -2 \\ &= -1\left(-2\right)-\left(x\right) \\ \text{factor -1 out of x } &= -1\left(-2+x\right) \\ \text{Factor -1 out of -1(-2)-(x) } &= -1\left(x-2\right) \\ & \text{reorder term.} \end{aligned}$$

Now we have

$$\frac{-1\left(x-2\right)\left(\sqrt{x+2}+2\right)}{x-2}.$$

Cancel out the common factor x-2

$$-1\left(\sqrt{x+2}+2\right).$$

distribute the -1

$$-\sqrt{x+2}-2.$$

Now we can plug 2 into this equation and get:

$$\begin{aligned} & -\sqrt{4}-2 \\ &= -4. \end{aligned}$$

Question 8:

Solution: ☺

First we must simplify the numerator, so first multiply to get a common denomonator on both sides.

$$\frac{1}{(x+4)^2} \cdot \frac{x^2}{x^2}.$$

And:

$$\frac{1}{x^2} \cdot \frac{(x+h)^2}{(x+h)^2}.$$

After this we get:

$$\frac{x^2}{x^2\,(x+h)^2} - \frac{(x+h)^2}{x^2\,(x+h)^2}.$$

Now that they have common denomonators, we can subtract them and get:

$$\frac{x^2-(x+h)^2}{x^2\,(x+h)^2}.$$

Now we use the difference of squares formula to simplify the numerator

$$a^2-b^2=(a+b)\,(a-b)\,.$$

Where $a=x^2$ and $b=(x+h)^2$

So:

$$(x+x+h)\,(x-(x+h))\,.$$

simplify:

$$\begin{aligned}(2x+h)\,&(x-x-h)\\ &=(2x+h)-h\\ &=-\,(2x+h)\,h.\end{aligned}$$

now that the numerator is simplifed our equation looks like:

$$-\frac{\frac{(2x+h)h}{x^2(x+h)^2}}{h}.$$

Now we can multiply by the reciprical, which cancels out the h on top and leaves us with:

$$-\frac{(2x+h)}{x^2\,(x+h)^2}.$$

and now if we plug in 0 for h we get

$$-\frac{2}{x^3}.$$

Question 11:

Solution: ☺