[7 pts; R2 p27 #92] After simplifying, the **numerator** of $\dfrac{4x^{-2}(yz)^{-1}}{2^3x^4y}$ is 1.

$$\frac{4x^{-2}(yz)^{-1}}{2^3x^4y} = \frac{4}{8x^4x^2yyz} = \frac{1}{2x^6y^2z}$$

[7 pts; R3 p33 #27] Find the **volume** V and **surface area** S of a rectangular box with length 8 feet, width 4 feet, and height 7 feet. Answer: $V = 224$ cubic feet and $S = 232$ square feet

The volume is $8 \times 4 \times 7 = 32 \times 7 = 224$. To find the surface area, we need to find the areas of all six sides. We can find the area of the three different ones, and then multiply by 2. That is, one side is $8 \times 4 = 32$, one is $8 \times 7 = 56$, and one is $4 \times 7 = 28$. Doubling these and adding to get the total surface area gives 232.

[7 pts; R4-c1] Perform the indicated operation and simplify: $(2x-5)(3x+4) = 6x^2 - 7x - 20$

[7 pts; R4 p40 Example 9b] Multiply out:
$(x-1)^3 = (x-1)^2(x-1) = (x^2-2x+1)(x-1) = x^3 - 2x^2 + x - x^2 + 2x - 1 = x^3 - 3x^2 + 3x - 1$

[7 pts; R5 p51 #122] Factor completely: $4(x+5)^3(x-1)^2 + 2(x+5)^4(x-1)$
$= 2(x+5)^3(x-1)[2(x-1) + (x+5)] = 2(x+5)^3(x-1)(3x+3) = 6(x+5)^3(x-1)(x+1)$

[5 pts; R6 p58 #13] When $2x^4 - 3x^3 + x + 1$ is divided by $2x^3 - 1$ the **quotient** is $x^2 - 2x + \dfrac{1}{2}$.

$$\begin{array}{rl|rrrr}
 & & & x^2 & -2x & +\frac{1}{2} \\
\hline
2x^2+x & +1 & 2x^4 & -3x^3 & & +x & +1 \\
 & & 2x^4 & +x^3 & +x^2 & & \\
\cline{3-5}
 & & & -4x^3 & -x^2 & +x & \\
 & & & -4x^3 & -2x^2 & -2x & \\
\cline{3-5}
 & & & & x^2 & +3x & +1 \\
 & & & & x^2 & +\frac{1}{2}x & +\frac{1}{2} \\
\cline{3-5}
 & & & & & \frac{5}{2}x & +\frac{1}{2}
\end{array}$$

[7 pts; R.6 p58 #19] When $x^3 - a^3$ is divided by $x - a$ the **quotient** is $x^2 + ax + a^2$.

You should know the factorization $x^3 - a^3 = (x-a)(x^2 + ax + a^2)$. This gives the answer to the question.

You could also use long division, as in the previous problem.

[7 pts; R7 p68 #47] After simplifying, the **numerator** of $\dfrac{x}{x+1} + \dfrac{2x-3}{x-1}$ is $3x^2 - 2x - 3$.

$$\frac{x}{x+1} + \frac{2x-3}{x-1} = \frac{x(x-1)}{(x+1)(x-1)} + \frac{(x+1)(2x-3)}{(x+1)(x-1)} = \frac{x^2 - x + 2x^2 - 3x + 2x - 3}{(x+1)(x-1)} = \frac{3x^2 - 2x - 3}{(x+1)(x-1)}$$

[7 pts; R7 p69 #72] After simplifying, the **numerator** of $\dfrac{1}{h}\left[\dfrac{1}{(x+h)^2} - \dfrac{1}{x^2}\right]$ is $-2x - h$.

$$\frac{1}{h}\left[\frac{1}{(x+h)^2} - \frac{1}{x^2}\right] = \frac{1}{h}\left[\frac{x^2}{x^2(x+h)^2} - \frac{(x+h)^2}{x^2(x+h)^2}\right] = \frac{1}{h}\left[\frac{x^2 - (x^2 + 2xh + h^2)}{x^2(x+h)^2}\right]$$
$$= \frac{1}{h}\left[\frac{x^2 - x^2 - 2xh - h^2)}{x^2(x+h)^2}\right] = \frac{1}{h}\left[\frac{-2xh - h^2}{x^2(x+h)^2}\right] = \frac{1}{h}\left[\frac{h(-2xh - h)}{x^2(x+h)^2}\right] = \frac{-2xh - h}{x^2(x+h)^2}$$

[7 pts; R8 p75 #35] Simplify: $\sqrt[3]{16x^4} - \sqrt[3]{2x} = \sqrt[3]{8x^3 \cdot 2x} - \sqrt[3]{2x} = 2x\sqrt[3]{2x} - \sqrt[3]{2x} = (2x-1)\sqrt[3]{2x}$

[7 pts; R8 p74 Example 7c] Simplify: $(x^{2/3}y)(x^{-2}y)^{1/2} = x^{2/3}yx^{-1}y^{1/2} = x^{2/3-1}y^{1+1/2} = x^{-1/3}y^{3/2} = \dfrac{y^{3/2}}{x^{1/3}}$

[5 pts; R8 p74 Example 7c] $\left(\dfrac{9x^2y^{1/3}}{x^{1/3}y}\right)^{1/2} = \left(\dfrac{9x^{2-1/3}}{y^{1-1/3}}\right)^{1/2} = \left(\dfrac{9x^{5/3}}{y^{2/3}}\right)^{1/2} = \dfrac{(9x^{5/3})^{1/2}}{(y^{2/3})^{1/2}} = \dfrac{3x^{5/6}}{y^{1/3}}$

[5 pts; 1.1 p94 #51] Solve this equation: $\dfrac{2x}{x^2-4} = \dfrac{4}{x^2-4} - \dfrac{3}{x+2}$

$\dfrac{2x}{x^2-4} = \dfrac{4}{x^2-4} - \dfrac{3(x-2)}{(x+2)(x-2)}$ $\dfrac{2x}{x^2-4} = \dfrac{4-3x+6}{x^2-4}$

The numerators must be equal: $2x = 10 - 3x$ $5x = 10$ $x = 2$

There is no solution because substituting $x = 2$ in the original equation leads to division by zero.

[5 pts; 1.1 p95 #94] The suggested list price of a new car is \$12,000. The dealer's cost is 85% of list. How much will you pay if the dealer is willing to accept \$100 over cost for the car?

Multiply the list price by .85, giving a dealer cost of \$10,200. Adding \$100 gives the answer: \$10,300.

You could also do this by subtracting 15% of \$12,000. This is like figuring out a tip of 15%. Shift the decimal point, to get \$1,200 and then add half of this, \$600, to get \$1,800. Subtracting from \$12,000 gives \$10,200.

[5 pts;1.2 p107 #85] Use the quadratic equation to find the real solutions, if any, of $x^2 + x = 4$.

Rewrite the equation as $x^2 + x - 4$. $x = \dfrac{-1 \pm \sqrt{1^2 - 4(1)(-4)}}{2(1)} = \dfrac{-1 \pm \sqrt{17}}{2}$

[5 pts; 1.2 p108 #97] An open box is to be constructed from a square piece of sheet metal by removing a square of side 1 foot from each corner and turning up the edges. If the box is to hold 4 cubic feet, then the dimensions of the sheet metal should be 4 feet by 4 feet.

After turning up the edges, the box will be 1 foot high. The base is square, so to hold 4 cubic feet, the box must be 2 feet wide by 2 feet long by 1 foot high.

Because 1 foot is cut off from each corner, to get a square base that is 2 feet by 2 feet you have to start with a piece of sheet metal that is 4 feet by 4 feet. It may help to draw a diagram.