1) (5 points) Solve the following system using elimination:

$$\begin{cases} 2x+3y+2z=-10 \\ x+y-4z=-5 \\ x-4y+2z=23 \end{cases}$$

① $2x+3y+2z=-10$
$-2x-2y+8z=10$
$y+10z=0$

② $2x+3y+2z=-10$
$-2x+8y-4z=-46$
$11y-2z=-56$

③ $y+10z=0$
$55y-10z=-280$

④ $56y=-280$
$\boxed{y=-5}$

⑤ $-5+10z=0$
$10z=5$
$\boxed{z=\frac{1}{2}}$

$x-5-4(\frac{1}{2})=-5$
$\boxed{x=2}$

$\boxed{(2,-5,\frac{1}{2})}$

2) (5 points) Solve the following system using elimination. If you are in a special case, say which case you are in and explain how you know:

$$\begin{cases} x+2y+2z=4 \\ x-3y+z=5 \\ 2x-y+3z=10 \end{cases}$$

① $-x-2y-2z=-4$
$x-3y+z=5$
$-5y-z=1$

② $-2x-4y-4z=-8$
$2x-y+3z=10$
$-5y-z=2$

③ $5y+z=-1$
$-5y-z=2$
$0=1$ false

No solution!
All variables cancelled
and a false statement
was left.

3) (3 points part *a*, 5 points part *b*) Consider the following problem.


Mike has yet to decide on a new hairstyle while playing the games.

Unable to miss a great deal, Mike goes wild during a video game sale at several stores. At Target, Mike buys 3 copies of *Final Fantasy XV*, 4 copies of *Uncharted 4*, and 2 copies of *Detroit* and spends \$120.38. At Best Buy, Mike buys 2 copies of *Final Fantasy XV*, 3 copies of *Uncharted 4* and one copy of *Detroit* for \$98.75. The price for one copy of *Final Fantasy XV* is \$10 more than twice the cost of *Detroit*. Assume the prices for each game does not change depending on where the game was purchase. How much does each game cost?

a) Name and define variables:

x = cost of FFXV
y = cost of U4
z = cost of Detroit

b) Set up the system but **do not solve it.**

$$\begin{cases} 3x+4y+2z=120.38 \\ 2x+3y+z=98.75 \\ x=10+2z \end{cases}$$

or $x-2z=10$

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4) (3 points each) Simplify completely.

a) $\sqrt{25}$ (You're welcome)

$\boxed{5}$

b) $\sqrt{x^2+4x+4}$

$= \sqrt{(x+2)^2}$

$= \boxed{x+2}$

c) $\sqrt[3]{-125}$

$= \boxed{-5}$

5) (2 points each) For the function $f(x)=\sqrt{4x-7}$, find the following or say why they don't exist. Write answers as an ordered pair:

a) $f(2) = \sqrt{4\cdot 2-7} = \sqrt{1} = 1$

$(2,1)$

b) $f\left(-\frac{1}{2}\right) = \sqrt{4(-\frac{1}{2})-7} = \sqrt{-9}$

$\boxed{\text{not real} \quad -9<0}$

6) (2 points each) For the function $f(x)=\sqrt{x-2}+3\ldots$

a) Explain the steps necessary to find the domain algebraically:

Set the radicand to be ≥ 0 and solve for the variable.

b) Find the domain and write the answer in interval notation:

$x-2 \geq 0$

$x \geq 2$

$[2,\infty)$

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7) (4 points each) Simplify. Write answers using positive exponents. ***For part a only,*** assume variables can represent any real number:

a) $\left(25x^2y^8\right)^{\frac{1}{2}}$

$= \boxed{5|x|y^4}$

b) $\left(-\frac{125x^3y^9}{z^3}\right)^{-\frac{2}{3}}$

$= \left(-\frac{z^3}{125x^3y^9}\right)^{2/3}$

$= \left(\sqrt[3]{-\frac{z^3}{125x^3y^9}}\right)^2 = \left(\frac{-z}{5xy^3}\right)^2 = \boxed{\frac{z^2}{25x^2y^6}}$

c) $\sqrt[3]{25}\cdot\sqrt[3]{25} = \sqrt[3]{625}$

$= \sqrt[3]{125}\sqrt[3]{5}$

$= \boxed{5\sqrt[3]{5}}$

d) $\sqrt[4]{x^2y^3z}\cdot\sqrt[4]{x^3yz}$

$= \sqrt[4]{x^5y^4z^2}$

$= \boxed{xy\sqrt[4]{xz^2}}$

e) $\frac{\sqrt{27x^3y^5}}{\sqrt{9x^2y^3}}$

$= \sqrt{\frac{27x^3y^5}{9x^2y^3}} = \sqrt{3xy^2} = \boxed{y\sqrt{3x}}$

8) (4 points each) Perform the indicated operation:

a) $9\sqrt{3}+11\sqrt{3}$

$= \boxed{20\sqrt{3}}$

b) $\sqrt{72}-\sqrt{32} = \sqrt{36}\sqrt{2} - \sqrt{16}\sqrt{2}$

$= 6\sqrt{2} - 4\sqrt{2}$

$= \boxed{2\sqrt{2}}$

c) $\left(2+\sqrt{3}\right)\left(1-\sqrt{5}\right)$

$\boxed{2 - 2\sqrt{5} + \sqrt{3} - \sqrt{15}}$

d) $\left(\sqrt{3x}-\sqrt{y}\right)^2 = (\sqrt{3x}-\sqrt{y})(\sqrt{3x}-\sqrt{y})$

$= \boxed{3x - 2\sqrt{3xy} + y}$

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9) (4 points each) Rationalize the denominator. Simplify as needed:

a) $\frac{4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2}$ $\underbrace{\sqrt{2}\cdot\sqrt{2}}_{2}$

$= \boxed{2\sqrt{2}}$

b) $\frac{3}{\sqrt{25x^3}} = \frac{3}{5x\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}}$ $\underbrace{\sqrt{x}\cdot\sqrt{x}}_{x}$ $= \boxed{\frac{3\sqrt{x}}{5x^2}}$

c) $\frac{8x^2}{\sqrt[5]{2x^4}} \cdot \frac{\sqrt[5]{2^4x}}{\sqrt[5]{2^4x}}$

$= \frac{8x^2\sqrt[5]{16x}}{2x} = \boxed{4x\sqrt[5]{16x}}$

d) $\frac{5}{(2+\sqrt{7})} \frac{(2-\sqrt{7})}{(2-\sqrt{7})} = \frac{10-5\sqrt{7}}{4-2\sqrt{7}+2\sqrt{7}-7}$

$= \boxed{\frac{10-5\sqrt{7}}{-3}}$

10) (4 points each) Solve the equation for the variable:

a) $\sqrt{x+12}-\sqrt{x}=-6$

(1) $\sqrt{x+12} = \sqrt{x}+6$

(2) $x+12 = x+12\sqrt{x}+36$

$-24 = 12\sqrt{x}$

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

(4) $4=x$ → doesn't work! $\boxed{\text{no solution}}$

b) $(x-3)^{\frac{1}{2}}+16=32$

$\left[(x-3)^{1/2}\right]^2 = 16^2$

$x-3=256$

$\boxed{x=259}$

11) (2 points each) What must be true in order to…

a) Add two radical expressions?

huh?

b) Multiply two radical expressions?

wha?

12) (1 point) How is this pronounced? $\sqrt[3]{x^4+5}$ tacos are your friend

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