1) (9 points) Solve the system using the elimination method:

$$\begin{cases} 2x+y+4z=12 \\ x+2y+2z=9 \\ 3x-3y-2z=1 \end{cases}$$

① $2x+y+4z=12$
$-2x-4y-4z=-18$
$-3y=-6$
④ $y=2$

② $-3x-6y-6z=-27$
$3x-3y-2z=1$
$-9y-8z=-26$

⑤ $-9(2)-8z=-26$
$-8z=-8$
$z=1$

$x+2(2)+2(1)=9$
$x=3$

$(3,2,1)$

2) (3 points each) Consider the following scenario:

In the exhaustive Foodie Olympics, the athletes Billy Burger, Patty Pizza, and Tommy Taco, all took home medals. Together they won a total of 282 medals. Billy Burger took home 10 more than Patty Pizza. Patty Pizza took home 28 more than Tommy Taco. How many medals did each athlete take home?

a) Name and define variables for this scenario:

x = # of medals won by Billy
y = # of medals won by Patty
z = # of medals won by Tommy

b) Setup a system of equations but **DO NOT SOLVE:**

$$\begin{cases} x+y+z=282 \\ x=10+y \\ y=28+z \end{cases}$$

or $x-y=10$
$y-z=28$

3) (2 points each) Simplify completely showing each step or explain why they are not real. ***Assume the variables in only part b can be negative***.

a) $2\sqrt[3]{8}+1$

$2(2)+1=5$

b) $\sqrt{x^2-6x+9}$

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

c) $25^{\frac{3}{2}}=(\sqrt{25})^3$

$=5^3=125$

Exponent is -5/3

d) $(8x^3)^{-\frac{5}{3}}$

$\dfrac{1}{(\sqrt[3]{8x^3})^5}=\dfrac{1}{(2x)^5}$

$=\dfrac{1}{32x^5}$

e) $(-25)^{\frac{1}{2}}=\sqrt{-25}$

Not real
negative under
square root

f) $-49^{\frac{1}{2}}=-\sqrt{49}$

$=-7$

2

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4) (2 points each) For the function $f(x)=\sqrt{8x+7}$, find the following or say why they don't exist in the real number system.

a) $f(3)$ $= \sqrt{8(3)+7}$

$= \sqrt{24+7}$

$= \sqrt{31}$

b) $f(-1)$ $= \sqrt{8(-1)+7} = \sqrt{-1}$

Not real.
can't have negative under square root.

5) (3 points each) For the function $f(x)=\sqrt{x+2}-4$...

a) Explain how to find the domain algebraically and then state the domain:

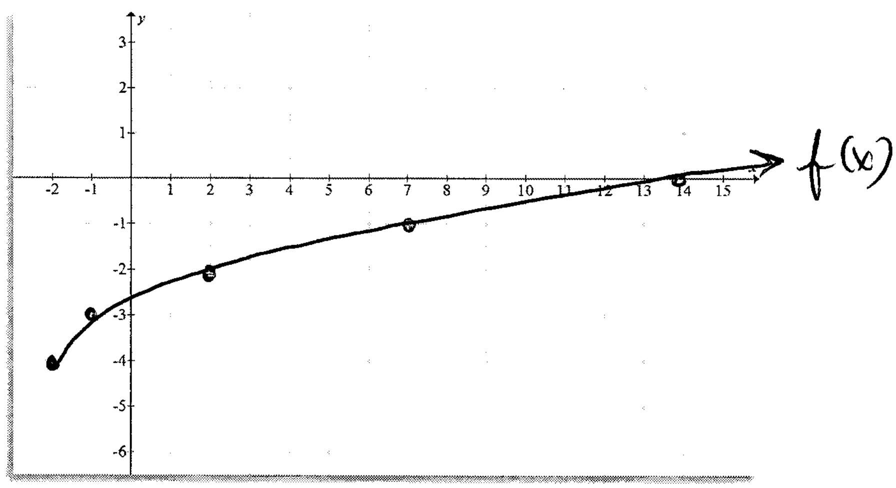
take radicand set greater than or equal to 0 and solve for x.

$x+2 \geq 0$

$x \geq -2$

b) Fill in the chart below and sketch a graph of the function *f*:

x	$f(x)$
−2	−4
−1	−3
2	−2
7	−1
14	0



6) (4 points each) Simplify. Write answers using positive exponents. ***Assume the variables in only part a can be negative***:

Exponent is - 4/3

a) $\left(256x^{12}y^{8}\right)^{\frac{1}{4}}$

$= \sqrt[4]{256x^{12}y^{8}}$

$= 4|x^3|y^2$

b) $\left(-\dfrac{216x^{6}y^{12}}{z^{18}}\right)^{-\frac{4}{3}}$

$= \left(\sqrt[3]{\left(-\dfrac{z^{18}}{216x^6y^{12}}\right)}\right)^4 = \left(\dfrac{-z^6}{6x^2y^4}\right)^4$

$= \dfrac{z^{24}}{1296x^8y^{16}}$

c) $\sqrt[4]{8}\cdot\sqrt[4]{4}$ $= \sqrt[4]{32}$

$= \sqrt[4]{16}\cdot\sqrt[4]{2} = 2\sqrt[4]{2}$

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

$= \sqrt[3]{x^4y^3z^3}$

$= xyz\sqrt[3]{x}$

e) $\dfrac{\sqrt[3]{18x^4y^8}}{\sqrt[3]{2x^3y^2}}$ $= \sqrt[3]{\dfrac{18x^4y^8}{2x^3y^2}}$

$= \sqrt[3]{9xy^6} = y^2\sqrt[3]{9x}$

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7) (4 points each) Perform the indicated operation:

a) $5\sqrt[3]{10}+8\sqrt[3]{10}-6\sqrt[10]{3}$

$= 13\sqrt[3]{10} - 6\sqrt[10]{3}$

b) $\sqrt[3]{192}-2\sqrt[3]{24}$ $= \sqrt[3]{64}\sqrt[3]{3} - 2\sqrt[3]{8}\sqrt[3]{3}$

$4\sqrt[3]{3} - 4\sqrt[3]{3}$

$= 0$

c) $\left(\sqrt{5}+\sqrt{xy}\right)^2$

$= 5 + 2\sqrt{5xy} + xy$

8) (2 points) Explain why you can cancel the radical and the exponents in $\sqrt[9]{x^9y^9}$ but you cannot cancel the radical and the exponents in $\sqrt[9]{x^9-y^9}$:

Huh...

9) (3 points each) Rationalize the denominator. Simplify as needed:

a) $\frac{5}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{2^2}}{\sqrt[3]{2^2}}$

$= \boxed{\frac{5\sqrt[3]{4}}{2}}$

b) $\frac{1}{\sqrt{64x^5}}$

$= \frac{1}{8x^2\sqrt{x}\cdot\sqrt{x}} \cdot \sqrt{x}$

$= \boxed{\frac{\sqrt{x}}{8x^3}}$

c) $\frac{(1+\sqrt{3})(2-\sqrt{2})}{(2+\sqrt{2})(2-\sqrt{2})}$

$= \frac{2-\sqrt{2}+2\sqrt{3}-\sqrt{6}}{4-2\sqrt{2}+2\sqrt{2}-2}$

$= \boxed{\frac{2-\sqrt{2}+2\sqrt{3}-\sqrt{6}}{2}}$

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

a) $\sqrt{12x-3}+1=4x$

$\sqrt{12x-3}=4x-1$

square $12x-3=16x^2-8x+1$

$0=16x^2-20x+4$

divide by 4 $0=4x^2-5x+1$

$(4x-1)(x-1)=0$

$\boxed{x=1 \quad x=\frac{1}{4}}$

b) $\sqrt{x+5}-\sqrt{x}=2$

$\sqrt{x+5}=2+\sqrt{x}$ square

$x+5=4+4\sqrt{x}+x$

$1=4\sqrt{x}$

$\frac{1}{4}=\sqrt{x}$

$\boxed{\frac{1}{16}=x}$

c) $2(x+1)^{\frac{1}{3}}=8$

$(x+1)^{1/3}=4$

$\left[(x+1)^{1/3}\right]^3=4^3$

$x+1=64$

$x=63$

11) (2 points each) Simplify the following in terms of *i* ***as needed***:

a) $\sqrt{-25}$ $\boxed{5i}$

b) $-\sqrt{49}$ $\boxed{-7}$

c) $-\sqrt{-36}$ $\boxed{-6i}$

12) (2 points) How is $\sqrt[6]{x+5}$ pronounced? carefully

13) (1 point each) Extra Credit. Fill in the blank:

a) $a^{-n}=$ ______

b) $a^0=$ ______

c) $a^{m+n}=$ ______

d) $a^{m-n}=$ ______

e) $(a^m)^n=$ ______

f) $(ab)^m=$ ______

g) $\frac{a^n}{b^n}=$ ______

h) $\left(\sqrt[n]{a}\right)^m=$ ______

i) $a^{\frac{1}{n}}=$ 0

j) $\frac{1}{a^{\frac{m}{n}}}=$ ______

20/30