1) (3 points each) Simplify completely.

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

5

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

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

$= x+2$

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

$= -5$

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

$= \sqrt{1} = 1$

(2, 1)

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

$= \sqrt{-9}$

Not real, can't take square root of negative

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

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

1) Set radicand to be greater than or equal to zero.

2) solve.

$x-2 \geq 0 \Rightarrow x \geq 2$

b) Explain how to use transformations of the graph of $y=\sqrt{x}$ to sketch the graph of f:

1) Right 2

2) Up 3

17

4) (3 points each) Simplify. Write answers using positive exponents. ***For part a only,*** assume variables can represent any real number:

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

$= \sqrt{25x^2y^8}$

$= |5|x|y^4$

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

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

$= \frac{z^2}{25x^2y^6}$

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

$= \sqrt[3]{5^4}$

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

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

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

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

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

$= y\sqrt{3x}$

5) (3 points each) Perform the indicated operation:

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

$20\sqrt{3}$

b) $\sqrt{72}-\sqrt{32}$

$\sqrt{36}\sqrt{2} - \sqrt{16}\sqrt{2}$

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

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

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

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

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

6) (1 point each) What must be true in order to…

a) Add two radical expressions?

b) Multiply two radical expressions?

don't stop believing

7) (3 points each) Rationalize the denominator. Simplify as needed:

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

$2\sqrt{2}$

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

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

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

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

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

8) (4 points each) Solve the equation for the variable:

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

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

$x+12 = x-12\sqrt{x}+36$

$-24 = -12\sqrt{x}$

$2 = \sqrt{x} \Rightarrow x = 4$

$\emptyset$

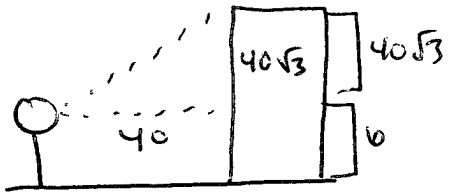
b) $(x-3)^{\frac{1}{2}}+16=32$

$(x-3)^{1/2} = 16$

$x-3 = 256$

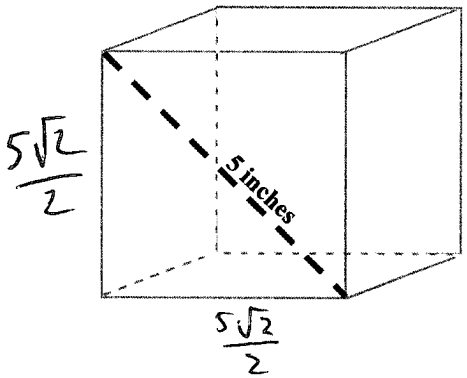
$x = 259$

9) (5 points) Standing 40 feet from a building, you can look up 60° and see the top of the building. If you are 6 feet tall, how tall is the building? Draw a picture and find the exact value.



$6+40\sqrt{3}$

10) (5 points) Consider a cube where the diagonal of one of the sides is 5 inches. Find the surface area of the cube.



Area of a side: $\frac{5\sqrt{2}}{2}\cdot\frac{5\sqrt{2}}{2} = \frac{25}{2}$

Surface area: $6\cdot\frac{25}{2} = 75\text{ in}^2$

11) (2 points) How is this pronounced? $\sqrt[3]{x^4+5}=$ Carefully

32

12) (3 points each) For the given ordered pairs $(4,-3)$ and $(10,-11)$, find...

a) The distance between them:

$\sqrt{(10-4)^2+(-11-(-3))^2}$

$= \sqrt{36+64} = 10$

b) Their midpoint:

$\left(\frac{4+10}{2}, \frac{-3+(-11)}{2}\right) = (7,-7)$

13) (2 points) Referring to #12 above, explain how to find the distance between the point $(4,-3)$ and the answer you found in part *b* without using the distance formula.

Whozagoodboy?  , ruff!

14) (3 points each) Perform the indicated operation. Write answer in the form $a+bi$:

a) $(4+5i)+(7-2i)$

$11+3i$

b) $(8-12i)-(-4-4i)$

$12-8i$

c) $(3-5i)^2 = (3-5i)(3-5i)$

$9-15i-15i+25i^2$ (−25)

$-16-30i$

d) $\frac{(2+3i)(5+4i)}{(5-4i)(5+4i)} = \frac{10+20i+8i+12i^2}{25+16}$ (−12)

$= \frac{-2+23i}{41} = \frac{-2}{41} + \frac{23}{41}i$

15) (2 points) Explain how to find i^{1025}:

eggs, milk, bread

16) (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) $a^{\frac{1}{n}} =$ 

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

22/32