60
~~52~~ 51
36

10/17/2012 - Sec 8.1 (cont.)
Sec 8.2

Math 1010

entire population ↙ sample group ↙

#36

\# of tagged → \# of deer total →

$$\frac{42}{x} = \frac{5}{75}$$

$$42(75) = 5x$$

$$\frac{3150}{5} = \frac{5x}{5}$$

$$630 = x$$

deer

#51 See yesterdays Notes, snow.edu/janaleej/1010

#60

1 person working, 1 person unworking

$$\underbrace{\frac{1}{\text{time alone}}\left(\text{time together}\right)}_{\text{working}} - \underbrace{\frac{1}{\text{time alone}}\left(\text{time together}\right)}_{\text{unworking}} = 1$$

inlet pipe
fill in 9 hrs

outlet pipe
empty in 12 hrs

$$\frac{1}{9}(x) - \frac{1}{12}(x) = 1$$

$$\frac{x}{\cancel{9}} \cdot \cancel{36} - \frac{x}{\cancel{12}} \cdot \cancel{36} = 1 \cdot 36 \qquad \text{LCD: } 36$$

$$4x - 3x = 36$$

$$x = 36$$

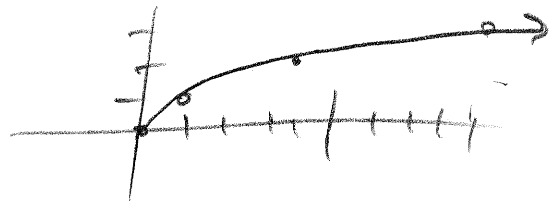
36 hrs

Sec 8.1 (cont.)

Last time

$f(x) = \sqrt{x}$

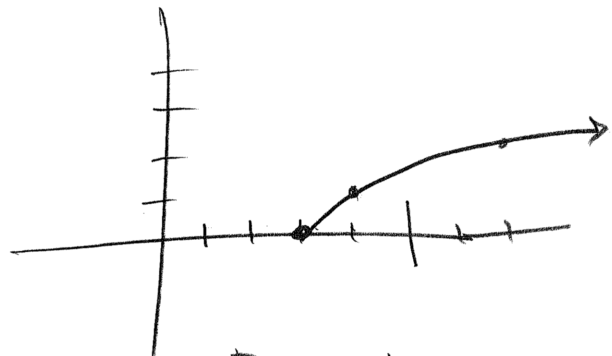
x	y
0	0
1	1
4	2
9	3



Graph $f(x) = \sqrt{x-3}$

x	y
0	$\sqrt{0-3} = \cancel{\sqrt{-3}}$
1	$\sqrt{1-3} = \cancel{\sqrt{-2}}$
3	$\sqrt{3-3} = \sqrt{0} = 0$
4	$\sqrt{4-3} = \sqrt{1} = 1$
7	$\sqrt{7-3} = \sqrt{4} = 2$

$$x - 3 \geq 0$$
$$+3 \quad +3$$
$$x \geq 3$$

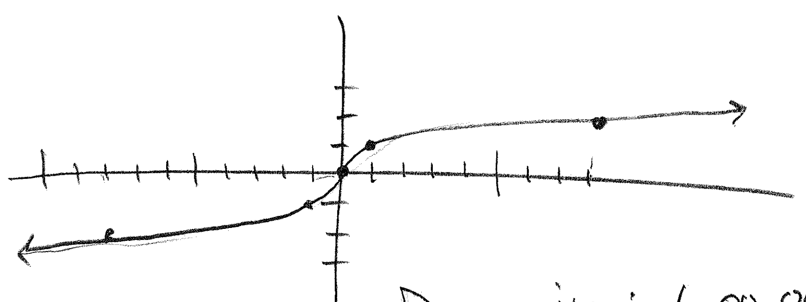


Domain
$[3, \infty)$

Range
$[0, \infty)$

$f(x) = \sqrt[3]{x}$ ← cube Root function

x	y
8	$\sqrt[3]{8} = 2$
1	$\sqrt[3]{1} = 1$
0	$\sqrt[3]{0} = 0$
-8	$\sqrt[3]{-8} = -2$
-1	$\sqrt[3]{-1} = -1$



Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

$\sqrt{a^2} = |a|$ $\quad \sqrt{(6)^2} = \sqrt{36} = 6$

$\sqrt{(-6)^2} = \sqrt{36} = 6$

$\sqrt[3]{a^3} = a$ $\quad \sqrt[3]{(4)^3} = \sqrt[3]{64} = 4$

$\sqrt[3]{(-4)^3} = \sqrt[3]{-64} = -4$

So Generally

if n is even then

$\sqrt[n]{a^n} = |a|$

if n is odd then

$\sqrt[n]{a^n} = a$

Decimal Approximation of $\sqrt{10}$

$\sqrt[x]{}$ or $\sqrt[x]{y}$ or $\sqrt[y]{x}$

$\sqrt[3]{10} = 3 \sqrt[x]{} \; 10 \; \boxed{=} \; 2.1544$

$(2.1544)^3 = 10$

Sec 8.2 Rational Exponents

Radicals are exponents in disguise

If $\sqrt[n]{a}$ is a Real Number then

$$\sqrt[n]{a} = a^{1/n}$$ ← index is the denominator!

Evaluate $4^{1/2} = 2$

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

Evaluate $81^{1/4}$

$\sqrt[4]{81} = 3$

$?^4 = 81 = 3^4$

81 → 9 9 → 3 3 3 3

Evaluate $(-16)^{1/2}$

$\sqrt[2]{(-16)}$

Not Real Number

$16^{5/2} = 16^{\frac{1}{2}\cdot 5} = \left(16^{1/2}\right)^5$

$= \left(\sqrt[2]{16}\right)^5$

$= (4)^5 = 1024$

$(a^n)^m = a^{n \cdot m}$

$\frac{5}{2} = \frac{1}{2} \cdot \frac{5}{1}$

Defn: $a^{\frac{m}{n}} = \left(a^{1/n}\right)^m = \left(\sqrt[n]{a}\right)^m$

Evaluate: $36^{3/2}$ ← index

$\left(\sqrt[2]{36}\right)^3 = 6^3 = 216$

$36\wedge(3/2) = 216$

$a^{m/n} = \left(a^m\right)^{1/n} = \sqrt[n]{a^m}$

Recall our exponent Rules

$a^r \cdot a^s = a^{r+s}$ $\qquad (a^r)^s = a^{rs}$

$\frac{a^r}{a^s} = a^{r-s}$ $\qquad a^{-r} = \frac{1}{a^r}$

$\left(\frac{a}{b}\right)^{-r} = \left(\frac{b}{a}\right)^r$ $\qquad (ab)^r = a^r b^r$

$\left(\frac{a}{b}\right)^r = \frac{a^r}{b^r}$

Ex: $\sqrt{2} \cdot \sqrt[4]{2} = 2^{1/2} \cdot 2^{1/4} = 2^{1/2 + 1/4}$

$= 2^{3/4}$

$= \sqrt[4]{2^3}$

$= \sqrt[4]{8}$

#81

$$\left(\frac{p^{-1/4}\,q^{-3/2}}{3^{-1}\,p^{-2}\,q^{-2/3}}\right)^{-2}$$

$$\frac{p^{-1/4\cdot -2}\,q^{-3/2\cdot -2}}{3^{-1\cdot -2}\,p^{-2\cdot -2}\,q^{-2/3\cdot -2}} = \frac{p^{\frac{1}{2}}\,q^{3}}{3^{2}\,p^{4}\,q^{4/3}}$$

$3-4/3$
$=\frac{9}{3}-\frac{4}{3}$
$=5/3$

$4-1/2=3\frac{1}{2}=7/2$

$$\boxed{\frac{q^{5/3}}{9\,p^{7/2}}}$$