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Advanced Math

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14) No. $x = y^2$, $y = \pm\sqrt{x}$ *

16) No $x + y^2 = 4$, $y^2 = 4 - x$, $y = \pm\sqrt{4-x}$ *

18) No $(x-2)^2 + y^2 = 4$, $y^2 = 4 - (x-2)^2$, $y = \pm\sqrt{4-(x-2)^2}$ *

20) Yes

22) No $|y| = 4 - x$, $y = \pm(4-x)$ *

26) $g(y) = 7 - 3y$
$g(0) = 7 - 3(0) = 7$
$g(\frac{7}{3}) = 7 - 3(\frac{7}{3}) = 0$
$g(s+2) = 7 - 3(s+2) = 1 - 3s$

28) $V(r) = \frac{4}{3}\pi r^3$
$V(3) = \frac{4}{3}\pi(3)^3 = \frac{4}{3}(27\pi) = 36\pi$
$V(\frac{3}{2}) = \frac{4}{3}\pi(\frac{3}{2})^3 = \frac{4}{3}(\frac{27}{8})\pi = \frac{9}{2}\pi$
$V(2r) = \frac{4}{3}\pi(2r)^3 = \frac{4}{3}(8r^3)\pi = \frac{32}{3}\pi r^3$

30) $F(x) = \sqrt{x+8} + 2$
$F(-8) = \sqrt{-8+8} + 2 = 2$
$F(1) = \sqrt{1+8} + 2 = 5$
$F(x-8) = \sqrt{x-8+8} + 2 = \sqrt{x} + 2$

32) $g(t) = \frac{2t^2+3}{t^2}$
$g(2) = \frac{2(2)^2+3}{2^2} = \frac{11}{4}$
$g(0) = \frac{2(0)^2+3}{0^2} = \emptyset$
$g(-x) = \frac{2(-x)^2+3}{(-x)^2} = \frac{2x^2+3}{x^2}$

34) $F(x) = |x| + 4$
$F(2) = |2| + 4 = 6$
$F(-2) = |-2| + 4 = 6$
$F(x^2) = |x^2| + 4 = x^2 + 4$

36) $F(x) = \begin{cases} x^2+2, & x \le 1 \\ 2x^2+2, & x > 1 \end{cases}$
$F(1) = (1)^2 + 2 = 3$
$F(-2) = (-2)^2 + 2 = 6$
$F(2) = 2(2)^2 + 2 = 10$

38) $g(x) = \sqrt{x-3}$

x	3	4	5	6	7
g(x)	0	1	$\sqrt{2}$	$\sqrt{3}$	2

42) $h(x) = \begin{cases} 9 - x^2, & x < 3 \\ x - 3, & x \ge 3 \end{cases}$

x	1	2	3	4	5
h(x)	8	5	0	1	2

44) $F(x) = \frac{3x-4}{5}$
$\left(0 = \frac{3x-4}{5}\right)5$
$0 = 3x - 4$
$4 = 3x$
$x = \frac{4}{3}$
$\{\frac{4}{3}\}$

46) $F(x) = x^3 - x$
$0 = x^3 - x$
$0 = x(x^2-1)$
$0 = x(x+1)(x-1)$
$\{0, -1, 1\}$

48) $x^2 + 2x + 1 = 3x + 3$
$x^2 - x - 2 = 0$
$(x-2)(x+1) = 0$
$\{2, -1\}$

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50) $x^4 - 2x^2 = 2x^2$
$x^4 - 4x^2 = 0$
$x^2(x^2-4) = 0$
$x^2(x+2)(x-2) = 0$
$\{0, \pm 2\}$

52) $g(x) = 1-2x^2$
domain: $\mathbb{R}$
(no fractions, no radicals)

54) $s(y) = \frac{3y}{y+5}$
$y+5 \neq 0$, $y \neq -5$
domain: $\mathbb{R}$ except $\{-5\}$

56) $F(t) = \sqrt[3]{t+4}$
domain $\mathbb{R}$
(cube roots allow negatives)

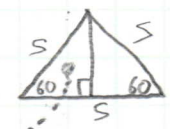
58) $h(x) = \frac{10}{x^2-2x}$
$x^2-2x \neq 0$; $x(x-2) \neq 0$
$\mathbb{R}$ except $\{0,2\}$

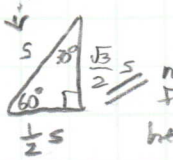
60) $F(s) = \frac{\sqrt{s-1}}{s-4}$
$s-4 \neq 0$; $s \neq 4$
$s-1 \geq 0$ $s \geq 1$
domain $[1,4)(4,\infty)$

62) $F(x) = \frac{2x}{x^2+1}$

-2	$-\frac{4}{5}$
-1	-1
0	0
1	1
2	$\frac{4}{5}$

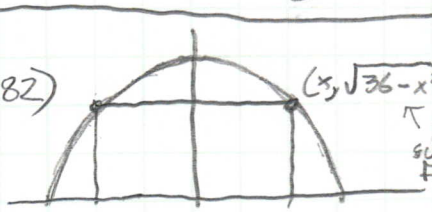
78) $A = \frac{1}{2}bh$
$A = \frac{1}{2}(s)\left(\frac{\sqrt{3}}{2}s\right)$
$A = \frac{\sqrt{3}}{4}(s^2)$

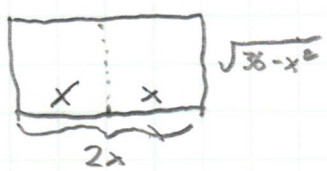




81) Since any two points on a line have the same slope: (0,y) (2,1) (x,0)
$\frac{y-1}{0-2} = \frac{1-0}{2-x}$ $\left(\frac{y-1}{-2} = \frac{1}{2-x}\right)\cdot -2$
$A = \frac{1}{2}bh$
$A = \frac{1}{2}xy$
$A = \frac{1}{2}\left(\frac{x}{x-2}\right)$
$y-1 = \frac{-2}{2-x}$ or $y-1 = \frac{2}{x-2}$
$y = \left(\frac{2}{x-2}\right)+1$
Note $1 = \frac{x-2}{x-2}$
$y = \frac{2+x-2}{x-2}$
$y = \frac{x}{x-2}$
domain: $(2,\infty)$
$x=2$ makes a vertical line
$x<2$ makes a positive slope!

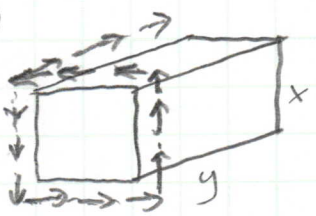
82)





$A = l \cdot w$
$A(x) = 2x\sqrt{36-x^2}$
domain $(0,6)$; if $x \leq 0$, you get negative area
if $x=0$, there's no rectangle
if $x=6$, there's no y-value

83)



length of arrows = 108
$108 = 4x+y$
$y = 108-4x$
$V = l \cdot w \cdot h$
$V = x \cdot x(108-4x)$
$V = x^2(108-4x)$
domain $(0,27)$; if $x \leq 0$, there's no box,
if $y \geq 27$ there's no height

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84) $p(t) = \begin{cases} 19.247 + 1.694t, & -6 \le t \le -1 \\ 19.305 + .427t + .033t^2, & 0 \le t \le 13 \end{cases}$

1978 $p(-2) = \$15,859$

1988 $p(8) = \$24,833$

1993 $p(13) = \$30,433$

85)

a) $C(x) = 12.30x + 98000$

b) $R(x) = 17.98x$

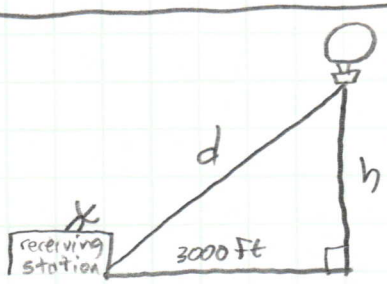
c) $P(x) = R(x) - C(x) = 17.98x - (12.30x + 98000)$

$P(x) = 5.68x - 98000$

86) a) $C(x) = .95x + 6000$

b) $\bar{C}(x) = \dfrac{.95x + 6000}{x}$

89)



$h^2 + 3000^2 = d^2$

$h^2 = d^2 - 9{,}000{,}000$

$h = \pm\sqrt{d^2 - 9{,}000{,}000}$

↑ Don't need, height!

$h(d) = \sqrt{d^2 - 9000000}$

domain $d^2 - 9000000 \ge 0$

$d^2 \ge 9000000$

$d \ge 3000$

$[3000, \infty)$