121 §5.3 #s 5, 7, 11, 23, 33, 37, 41, 45

Solve. Graphical Support

(7) $5x - y = 6$

$y = x^2$

$5x - x^2 = 6$

$-x^2 + 5x - 6 = 0$

$x^2 - 5x + 6 = 0$

$(x-2)(x-3) = 0$

$x \in \{2, 3\}$

$x = 2$:

$5x - y = 6$

$5(2) - y = 6$

$10 - y = 6$

$-y = -4$

$y = 4$

$(2, 4)$

$x = 3$

$5(3) - y = 6$

$15 - y = 6$

$-y = -9$

$y = 9$

$(3, 9)$

$\boxed{\{(2,4), (3,9)\}}$

(5) $y = x^2$

$y = x$

$x = x^2$

$x^2 - x = 0$

$x(x-1) = 0$

$x \in \{0, 1\}$

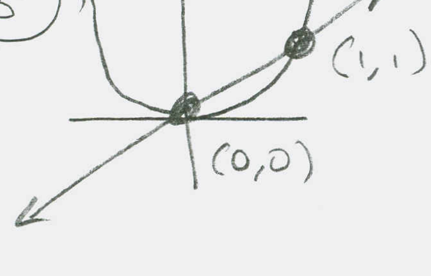
$x = 0 \Rightarrow y = 0 \Rightarrow (0,0)$

$x = 1 \Rightarrow y = 1 \Rightarrow (1,1)$

$\boxed{\{(0,0), (1,1)\}}$

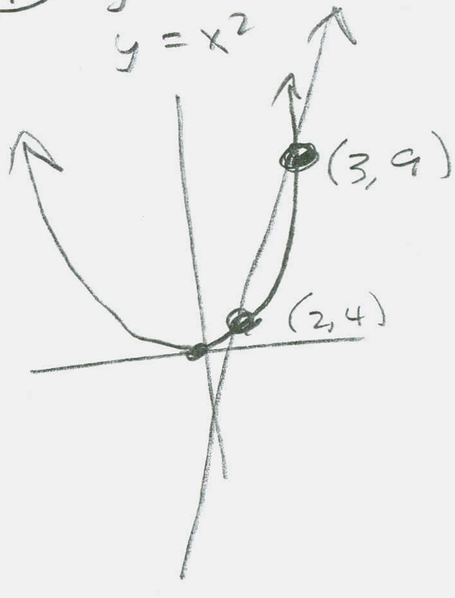
~~11~~ Graphs:

(5)



(7) $y = 5x - 6$

$y = x^2$



121 §5.3 #s 11, 23, 33, 37, 41, 45

11

$y = |x|$

$y = x^2$

$|x| = x^2$

$x = x^2$ OR $x = -x^2$

$x^2 - x = 0$ $\quad$ $x^2 + x = 0$

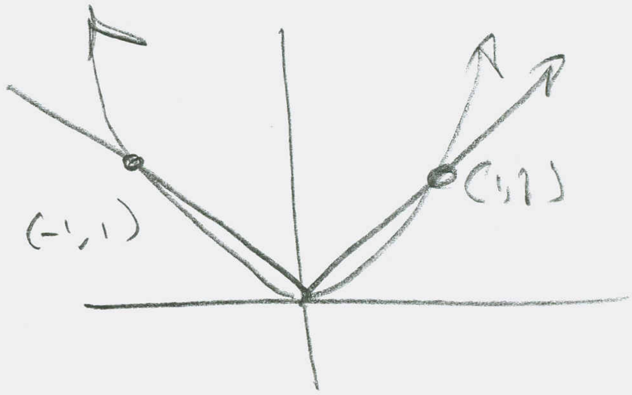
$x(x-1) = 0$ $\quad$ $x(x+1) = 0$

$x \in \{0, 1\}$ $\quad$ $x \in \{0, -1\}$

$x = 0 \Longrightarrow y = 0 \quad (0,0)$

$x = 1 \longrightarrow y = 1 \quad (1,1)$

$x = -1 \longrightarrow y = 1 \quad (-1,1)$



23

$2x^2 - y^2 = 1 \Longrightarrow -y^2 = -2x^2 + 1 \Longrightarrow y^2 = 2x^2 - 1$

$x^2 - 2y^2 = -1 \Longrightarrow x^2 - 2(2x^2 - 1) = -1$

$x^2 - 4x^2 + 2 = -1$

$-3x^2 + 3 = 0$

$3x^2 - 3 = 0$

$3(x^2 - 1) = 0$

$3(x-1)(x+1) = 0$

$x \in \{\pm 1\}$

$x = 1 \Longrightarrow 2 - y^2 = 1$

$\Longrightarrow -y^2 = -1$

$\Longrightarrow y^2 = 1$

$\Longrightarrow y = \pm 1$

$x = -1 \Longrightarrow \ldots \Longrightarrow y = \pm 1$

This gives $\boxed{\{(1,1), (-1,1), (-1,1), (-1,-1)\}}$

Skip graphs

we aren't doing hyperbolas

121 §5.3 #s 33, 37, 41, 45

33

$$\frac{4}{x} + \frac{5}{y^2} = 12$$

$$\frac{3}{x} + \frac{7}{y^2} = 22$$

$$\frac{4}{x} + \frac{5}{y^2} = 12$$

$$\frac{4}{x} = 12 - \frac{5}{y^2}$$

$$\frac{4}{x} = \frac{12y^2 - 5}{y^2}$$

$$\frac{x}{4} = \frac{y^2}{12y^2 - 5}$$

$$x = \frac{4y^2}{12y^2 - 5}$$

$$\frac{3}{x} + \frac{7}{y^2} = 22$$

$$\frac{3}{\left(\frac{4y^2}{12y^2-5}\right)} + \frac{7}{y^2} = 22$$

$$\frac{36y^2 - 15}{4y^2} + \frac{7}{y^2} = 22$$

$$\frac{36y^2 - 15 + 28}{4y^2} = \frac{88y^2}{4y^2}$$

$$36y^2 + 13 = 88y^2$$

$$52y^2 = 13$$

$$y^2 = \frac{13}{52} = \frac{1}{4}$$

$$y = \pm\sqrt{\frac{1}{4}} = \pm\frac{1}{2}$$

$$y^2 = \frac{1}{4};$$

$$\Rightarrow x = \frac{4\left(\frac{1}{4}\right)}{12\left(\frac{1}{4}\right) - 5}$$

$$= \frac{1}{3-5} = -\frac{1}{2}$$

$$\boxed{\left\{\left(-\tfrac{1}{2}, -\tfrac{1}{2}\right), \left(-\tfrac{1}{2}, \tfrac{1}{2}\right)\right\}}$$

121 §5.3 #s 37, 41, 45

37 $y = 2^{x+1}$

$y = 4^{-x}$

$y = 4^{-x} = (2^2)^{-x} = 2^{-2x}$

$2^{-2x} = 2^{x+1}$

$-2x = x+1$

$-3x = 1$

$\boxed{x = -\frac{1}{3}}$

$x = -\frac{1}{3}$:

$y = 2^{-\frac{1}{3}+1} = 2^{\frac{2}{3}} = \sqrt[3]{4}$

$\{(-\frac{1}{3}, \sqrt[3]{4})\}$

41 $y = \log_2(x+2) \Longrightarrow 2^y = x+2 \longrightarrow x = 2^y - 2$

$y = \log_4(x) \Longrightarrow 4^y = x$

$(2^2)^y = x$

$2^{2y} = x$

So, $2^{2y} = 2^y - 2$

$(2^y)^2 = 2^y - 2$

$(2^y)^2 - 2^y + 2 = 0$

$u^2 - u + 2 = 0$

This looks ugly.

$u^2 - u = -2$

$u^2 - u + (\frac{1}{2})^2 = -2 + \frac{1}{4} = \frac{-8+1}{4}$

$(u - \frac{1}{2})^2 = -\frac{7}{4}$

Probably messed up. will lead to nonreal solutions, because of $-\frac{7}{4}$

121 §5.3 #s 41, 45

Try again: Helps if you copy it correctly

$y = \log_2(x+2)$

$y = 3 - \log_2(x)$

$\log_2(x+2) = 3 - \log_2(x)$

$\log_2(x+2) + \log_2(x) = 3$

$\log_2(x(x+2)) = 3$

$x(x+2) = 2^3 = 8$

$x^2 + 2x = 8$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = -4$ OR $x = 2$

$\notin \mathcal{D}$

$x = 2$:

$y = \log_2(2+2)$

$= \log_2(4)$

$= \log_2(2^2)$

$= 2 = y$

$\boxed{\{(2,2)\}}$

$y = 3 - \log_2(x)$

$2 = 3 - \log_2(2)$?

$2 = 3 - 1$? ✓

121 §5.3 #45

45 $y = 2^x$

$x = \log_4(y) \Longrightarrow 4^x = y$

So,

$2^x = 4^x = 2^{2x}$

$2^x = 2^{2x}$

$x = 2x$

$-x = 0$

$x = 0$

$x = 0$:

$y = 2^0 = 1$

$(0,1)$

Check:

$0 = \log_4(1)$?

Yes.

$$\boxed{\{(0,1)\}}$$

On a test, I'm more concerned that you know where you are, where you want to get and know the legal moves to get there, even if you don't get to the final answer.