Bergen County Mathematics League

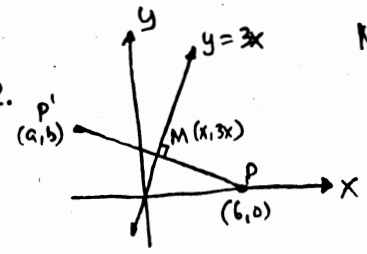
Problem Author: Steve Conrad, www.mathleague.com

Problem Editor: Dan Flegler, www.mathleague.com

Brief Contest Solutions #5 **2013-2014**

5-1. Subtracting 1 from each side, $\sqrt{x} = x$. Thus, $x = \boxed{0, 1}$

5-2.



Method I:

Since $m_{\overline{MP}} = -\frac{1}{3}$, $\frac{3x-0}{x-6} = -\frac{1}{3}$, so $x = \frac{3}{5}$, $3x = \frac{9}{5}$

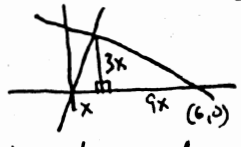
M is the midpt of $\overline{P'P}$. Therefore,

$$\left.\begin{aligned} \frac{a+6}{2} = \frac{3}{5} &\Rightarrow a = \frac{-24}{5} \\ \frac{b+0}{2} = \frac{9}{5} &\Rightarrow b = \frac{18}{5} \end{aligned}\right\} \Rightarrow (a,b) = \boxed{\left(\frac{-24}{5}, \frac{18}{5}\right)}$$

Method II:

By $\sim\triangle$s, $10x = 6$, so $x = 3/5$

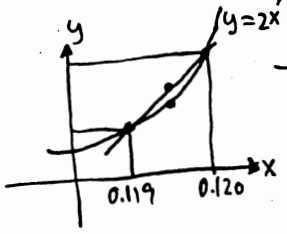
Continue as in Method I.



5-3. Work backwards:

end of	Player A	Player B	Player C
Round 3	\$24	\$24	\$24
Round 2	48	12	12
Round 1	24	6	42
At start:	\$12	\$39	\$21

5-4.



The interpolated value is greater than the actual value (because of the concavity of the graph) in this case; so round DOWN to get $f(0.1195) = \frac{1.085982 + 1.086735}{2}$, rounded down to $\boxed{1.086358}$.

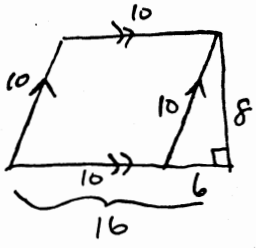
5-5. $729 - 243 = 486$; $729 - 243 + 27 = 513$;

$729 - 243 + 27 - 9 - 3 - 1 = 500$. Thus, $A = 729 + 27 = 756$

$B = 243 + 9 + 3 + 1 = 256$

$(A, B) = \boxed{(756, 256)}$

5-6.



Area $= \frac{10+16}{2}(8) = \boxed{104}$