AP Calculus AB Mr. Shubleka Quiz: 14

Present neatly ~~on separate paper~~. Justify for full credit. No Calculators.

Name SHUBLEKA/KEY. Score ______ ~10 minutes

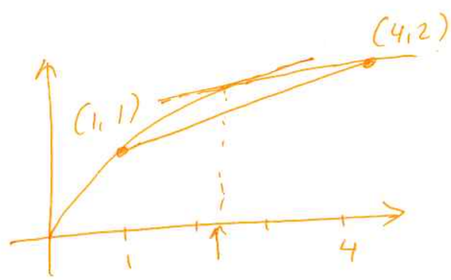
1.

Find the x-coordinate of the point on the graph of $y = \sqrt{x}$ where the tangent line is parallel to the secant line that cuts the curve at $x = 1$ and $x = 4$. [5 points]

2.

Find k if the curve $y = x^2 + k$ is tangent to the line $y = 2x$. [5 points]

1



$y = \sqrt{x}$

$\frac{dy}{dx} = \frac{1}{2\sqrt{x}}$ at $x = a$, slope has to be equal to $\frac{y_2 - y_1}{x_2 - x_1} = \frac{2-1}{4-1} = \frac{1}{3}$.

$\left.\frac{dy}{dx}\right|_{x=a} = \frac{1}{2\sqrt{a}} = \frac{1}{3} \Rightarrow 2\sqrt{a} = 3 \Rightarrow \sqrt{a} = \frac{3}{2} \Rightarrow a = \frac{9}{4} = 2.250$

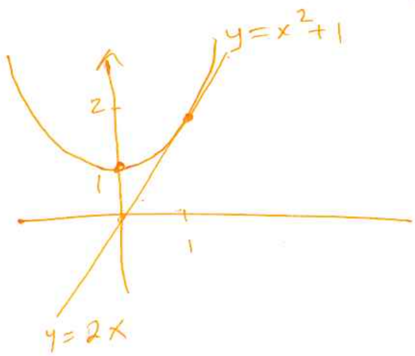
$\boxed{x = \frac{9}{4}}$

2 $y = x^2 + k$ is tangent to $y = 2x$ @ $x = a$, $y = 2a$

The slopes are the same, so: $\left.\frac{d}{dx}(x^2 + k)\right|_{x=a} = \left.\frac{d}{dx}(2x)\right|_{x=a}$

$\Leftrightarrow \left.2x\right|_{x=a} = \left.2\right|_{x=a} \Leftrightarrow 2a = 2 \Leftrightarrow a = 1$

If $a = 1$, the $y = 2 \cdot a = 2$, so we plug in $(1, 2)$



$2 = 1^2 + k \Rightarrow \boxed{k = 1}$

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