Quiz 6 Solution

1. $L_2(x) = f(2) + f'(2)\cdot(x-2)$

$f(2) = 2^2 + 3\cdot 2 + 1 = 11$,

$f'(x) = 2x + 3 \Rightarrow f'(2) = 2\cdot 2 + 3 = 7$

$\Rightarrow L_2(x) = 11 + 7\cdot(x-2) \Rightarrow L_2(\frac{21}{10}) = 11 + 7\cdot(\frac{21}{10} - 2)$

$= 11 + 7\cdot\frac{1}{10} = 11.7$

2. (1) critical points:

$\frac{dy}{dx} = \sqrt{6-x} + x\cdot\frac{1}{2}(6-x)^{-\frac{1}{2}}\cdot(-1) = \sqrt{6-x} - \frac{\frac{x}{2}}{\sqrt{6-x}} = \frac{6-x-\frac{x}{2}}{\sqrt{6-x}}$

$= \frac{6-\frac{3}{2}x}{\sqrt{6-x}}$

$\frac{dy}{dx} = 0 \Rightarrow 6 - \frac{3}{2}x = 0 \Rightarrow x = 6\cdot\frac{2}{3} = 4 \in [2,5]$

$\frac{dy}{dx}$ DNE $\Rightarrow x = 6$, but 6 is not in the domain $[2,5]$.

So critical point is $x=4$.

(2) end points: $x=2$, $x=5$

(3) Compare the values: $y(4) = 4\cdot\sqrt{6-4} = 4\sqrt{2}$, $y(2) = 2\cdot\sqrt{6-2} = 4$,

$y(5) = 5\cdot\sqrt{6-5} = 5$.

If you don't know $4\sqrt{2}$ you can compare the squares.

$(4\sqrt{2})^2 = 16\cdot 2 = 32$, $4^2 = 16$, $5^2 = 25$ $\Rightarrow$ $4\sqrt{2}$ is the absolute maximum $(x=4)$

4 is the absolute minimum $(x=2)$