Homework 2 feedback

18/20

1. For (b), there was an arithmetic error. $\frac{\pi}{3}\cos(\pi/3) = \pi/6$, not $1/6$.
2. Good!
3. (1/2) The problem was quite clear about how you should compute the derivative from the limit definition. It goes as follows:

$$\frac{\sqrt[3]{x+h}-\sqrt[3]{x}}{h}\cdot\frac{\sqrt[3]{x+h}^2+\sqrt[3]{x+h}\sqrt[3]{x}+\sqrt[3]{x}^2}{\sqrt[3]{x+h}^2+\sqrt[3]{x+h}\sqrt[3]{x}+\sqrt[3]{x}^2} = \frac{\sqrt[3]{x+h}^3-\sqrt[3]{x}^3}{h\cdot(\sqrt[3]{x+h}^2+\sqrt[3]{x+h}\sqrt[3]{x}+\sqrt[3]{x}^2)}$$
$$= \frac{1}{\sqrt[3]{x+h}^2+\sqrt[3]{x+h}\sqrt[3]{x}+\sqrt[3]{x}^2},$$

   and taking $h \to 0$ we find that the limit is equal to $\frac{1}{3\sqrt[3]{x^2}} = \frac{1}{3}x^{-2/3}$.

4. Good!
5. Good!
6. Good!
7. Good!
8. (1/2) Why is the slope 2? More detail is needed.
   Here's is summary of the solution: the equation of the tangent line passing through an arbitrary point (a, a^2) is

$$(y-a^2) = (2a)(x-a) \Leftrightarrow y = 2ax - a^2.$$

   Thus, in order for this line to pass through the point $(0, -1)$, we need $a^2 = 1$, hence $a = \pm 1$ and the two equations are given by $y = 2x - 1$, $y = -2x - 1$.