1) (c or 6) At $x=2$, $x^2+4=8$. $x+k$ must equal 8 at $x=2; k=6$.

2) (b or 1) $y=(x-1)^{\frac{7}{3}}; y'=\frac{7}{3}(x-1)^{\frac{4}{3}}; y''=\frac{28}{9}(x-1)^{\frac{1}{3}}$. The curve changes concavity at $x=1$ only. There is one point of inflection.

3) (b) $f'(x)=4-\frac{4}{x^2}+\frac{1}{4}=\frac{17x^2-16}{4x^2}$.

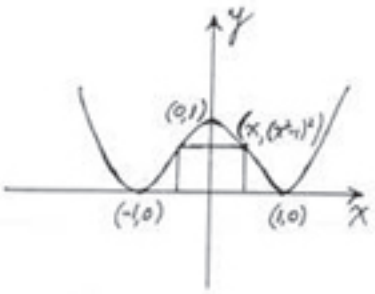
4) (d) Using the definition of the derivative of a function, $f(x)=\sqrt{x}$;

$f'(x)=\frac{1}{\sqrt{x}}$; $f'(a^2)=\frac{1}{2a}$.

5) (a or 146.563) $h=-16t^2+90t+20$; $v=-32t+90$. When $v=0, t=\frac{90}{32}$.

$h=-16(\frac{90}{32})^2+90(\frac{90}{32})+20=146.563$

6) (a or.572) $A=2x(x^2-1)^2$. Using a calculator, the maximum value for A when $-1\le x\le 1$ is .572. (If $x>1$ the rectangle would not be inscribed in the given region.) Or, using



calculus, $A'=2x(2(x^2-1)2x)+2(x^2-1)^2=0$, $x=\frac{\sqrt{5}}{5}$ for max,

$A=\frac{2}{5}\sqrt{5}\cdot\frac{16}{25}=.572$.

7) $(\frac{a}{\sqrt{2}},\frac{b}{\sqrt{2}})$ $PQ=2x$. $A=\frac{1}{2}(2x)y=xy$. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$; $y=\frac{b}{a}\sqrt{a^2-x^2}$.

$A=x\cdot\frac{b}{a}\sqrt{a^2-x^2}$. $\frac{dA}{dx}=\frac{b}{a}\sqrt{a^2-x^2}+x\cdot\frac{b}{a}\cdot\frac{-x}{\sqrt{a^2-x^2}}=0$.

$\frac{dA}{dx}=a^2-x^2-x^2=0$. $x=\frac{a}{\sqrt{2}}, y=\frac{b}{a}\sqrt{a^2-\frac{a^2}{2}}=\frac{b}{a}\cdot\frac{a}{\sqrt{2}}=\frac{b}{\sqrt{2}}$.

$Q(\frac{a}{\sqrt{2}},\frac{b}{\sqrt{2}})$ or $(\frac{a\sqrt{2}}{2},\frac{b\sqrt{2}}{2})$

8) (P(2,2), R(-1,-4)) From the coordinates the slope of $PR=\frac{\frac{1}{2}a^2+3+c^2}{a-c}$.

From the derivatives the slope of $PR=a=-2c$. Substituting; $\frac{\frac{1}{2}(-2c)^2+3+c^2}{-2c-c}=-2c$.

$\frac{3c^2+3}{-3c}=-2c$; $3c^2=3, c=-1$ (QIII), $-3-c^2=-4$. $a=-2(-1)=2$, $\frac{1}{2}2^2=2$, P(2,2), R(-1,-4).

(Both coordinates must be correct to receive credit.)