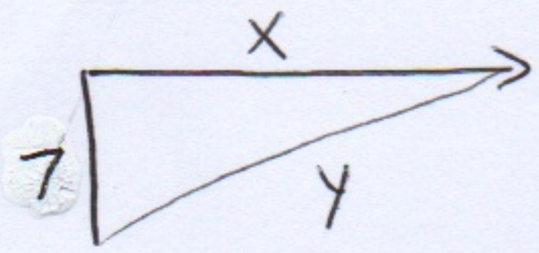
1.



$x^2+7^2=y^2$

$\frac{2xx'}{2} = \frac{2yy'}{2}$

$xx' = yy'$

$y = 8$

$x' = 480$

$x^2+7^2=y^2$

$x^2+49=8^2$

$x^2+49=64$

$-49 \quad -49$

$x^2=15$

$x=\sqrt{15}$

$x\,x' = yy'$

$\frac{\sqrt{15}\cdot 480}{8} = \frac{8y'}{8}$

$60\sqrt{15} = y'$

$232 \approx y'$

About 232 mi/h

2. Let $f(x)=\sqrt[3]{x}$ and $a=27$

So $f(a)=f(27)$

$=\sqrt[3]{27}$

$=3$

Point: $(27,3)$

$m=f'(x)=\frac{1}{3}x^{-\frac{2}{3}}$

$=\frac{1}{3x^{\frac{2}{3}}}$

$=\frac{1}{3\sqrt[3]{x}^2}$

→ #2 Continued

$m=\frac{1}{3\sqrt[3]{27}^2}$

$=\frac{1}{3\cdot 3^2}$

$=\frac{1}{27}$

$y-3=\frac{1}{27}(x-27)$

$y-3=\frac{1}{27}x-1$

$+3 \qquad +3$

$y=\frac{1}{27}x+2$

$\sqrt[3]{27.01} \approx \frac{1}{27}(27.01)+2$

$\approx \boxed{3.0004}$

---

3. $dy=f'(x)dx$

$dy=e^{\frac{x}{2}}(\frac{1}{2})dx$

$\boxed{dy=\frac{1}{2}e^{\frac{x}{2}}dx}$

---

4. $f'(x)=5\sinh x+5x\cosh x-3\sinh x=2\sinh x+5x\cosh x$

---

5. $f'(x)=\frac{2x+1}{x^2+x-1}$

$f'(x)=0$

$2x+1=0$

$-1 \quad -1$

$\frac{2x}{2}=\frac{-1}{2}$

$x=-\frac{1}{2}$

$f'(x)$ dne

$x^2+x-1=0$

$x=\frac{-1\pm\sqrt{1^2-4(1)(-1)}}{2(1)}$

$x=\frac{-1\pm\sqrt{1+4}}{2}$

$x=\frac{-1\pm\sqrt{5}}{2}$ ← Not in the domain of $f(x)$ so we don't have to check these.

$f(-2)=\ln((-2)^2+-2-1)=\ln 1=0$

$f(2)=\ln(2^2+2-1)=\ln 5 \approx 1.609$

There's no absolute min since this function isn't continuous on $[-2,2]$: (my mistake)
The absolute max is $(2, \ln 5)$.