1) $G(x)=\int_{2x}^{x^5}\frac{dt}{t^2+1} \Rightarrow G'(x)=\frac{5x^4}{x^{10}+1}-\frac{2}{4x^2+1}$

2) $I=\int x^4(2+x^5)^{1/5}dx=\frac{1}{5}\int 5x^4(2+x^5)^{1/5}dx$

$=\frac{1}{5}\frac{(2+x^5)^{\frac{6}{5}}}{\frac{6}{5}}+c=\frac{(2+x^5)^{6/5}}{6}+c$

3) $y=(3x)^{x^2} \Rightarrow \ln y=x^2\ln 3x$

$\Rightarrow \frac{y'}{y}=2x\ln 3x+x^2\cdot\frac{3}{3x}$

$\Rightarrow y'=(2x\ln 3x+x)(3x)^{x^2}$

4) $I=\int\frac{x\,6^{x^2}}{3+6^{x^2}}dx=\left(\int\frac{du}{u}\right)\cdot\frac{1}{2\ln 6}$

$u=3+6^{x^2}$

$du=6^{x^2}(2x)\ln 6\,dx$

$I=\frac{1}{2\ln 6}\ln(3+6^{x^2})+c$