

$$1) G(x) = \int_{2x}^{x^3} \frac{dt}{t^2+1}$$

$$\Rightarrow G'(x) = \frac{3x^2}{x^6+1} - \frac{2}{4x^2+1}$$

$$2) I = \int x^4 (1+x^5)^{\frac{1}{10}} dx$$

$$u = 1+x^5 \\ du = 5x^4 dx$$

$$= \frac{1}{5} \int u^{\frac{1}{10}} du$$

$$= \frac{1}{5} \frac{u^{\frac{11}{10}}}{\frac{11}{10}} + C = \frac{2}{11} (1+x^5)^{\frac{11}{10}} + C$$

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

$$\Rightarrow \frac{y'}{y} = 2x \ln x + x^2 \cdot \frac{1}{x}$$

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

$$4) I = \int \frac{x 3^{x^2}}{3 + 3^{x^2}} dx$$

$$u = 3 + 3^{x^2} \\ du = 3^{x^2} 2x \ln 3$$

$$= \frac{1}{2 \ln 3} \int \frac{du}{u}$$

$$= \frac{1}{2 \ln 3} \ln(3 + 3^{x^2}) + C$$