Name: Solutions. Section:

1. Find the derivative of $f(x) = x^2 \sec(5x) + \sqrt{9x - 2\cos x}$

$$f'(x) = 2x \cdot \sec(5x) + x^2 \cdot \sec(5x) \cdot \tan(5x) \cdot 5$$
$$+ \frac{1}{2}(9x - 2\cos x)^{-1/2} \left[9 + 2\sin x\right]$$

2. Compute the integral $\int \frac{\cos x}{(1+3\sin x)^7}\, dx$

$$u = 1 + 3\sin x$$
$$du = 3\cos x\, dx$$

$$\int \frac{\frac{1}{3} du}{u^7} = \frac{1}{3}\int u^{-7}\, du$$
$$= \frac{1}{3}\frac{u^{-6}}{-6} + C$$
$$= -\frac{1}{18}\frac{1}{(1+3\sin x)^6} + C$$

3. Compute the limit $\lim_{x\to\infty} \dfrac{\sqrt[3]{x^2-1}}{x}$.

$$= \lim_{x\to\infty} \frac{\sqrt[3]{x^2-1}}{\sqrt[3]{x^3}} = \lim_{x\to\infty} \sqrt[3]{\frac{x^2-1}{x^3}}$$

$$= \sqrt[3]{\lim_{x\to\infty}\left(\frac{1}{x}-\frac{1}{x^3}\right)}$$

$$= \sqrt[3]{0-0} = 0$$

4. Indicate whether the following functions are one-to-one or not. For the ones that are one-to-one, draw their inverse on the same plot.