Name: Solutions Section: 11 12 13

1. Find the derivative of $f(x) = x^3 \sec(7x) + (9x - 2\tan x)^{2/3}$

$$f'(x) = 3x^2 \cdot \sec(7x) + x^3 \cdot \sec(7x)\tan(7x) \cdot 7$$

$$+ \frac{2}{3}(9x - 2\tan x)^{-1/3}(9 - 2\sec^2 x)$$

2. Compute the integral $\int \frac{\sin x}{(1+7\cos x)^5}\, dx$

u-sub $u = 1 + 7\cos x$

$du = -7\sin x\, dx$

$$= \int \frac{\left(-\frac{1}{7}du\right)}{u^5} = -\frac{1}{7}\int u^{-5}\, du$$

$$= -\frac{1}{7}\,\frac{u^{-4}}{-4} + C$$

$$= \frac{1}{28}(1+7\cos x)^{-4} + C$$

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.