MATH 161: Quiz 6

Name: key

Directions:

- Show your thought process (commonly said as ”show your work”) when solving each problem for full credit.
- If you do not know how to solve a problem, try your best and/or explain in English what you would do.
- Good luck!

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1. Differentiate the following. You are allowed to use shortcuts.

   (a) $f(x) = -2(x^2 - 1)\sin(x)$ left right product rule.

$$f'(x) = -2 \frac{d}{dx}\left[(x^2-1)\cdot\sin(x)\right]$$

$$= -2\left((x^2-1)\cdot\frac{d}{dx}[\sin(x)] + \sin(x)\cdot\frac{d}{dx}(x^2-1)\right)$$

$$= -2\left((x^2-1)\cdot\cos(x) + \sin(x)\cdot 2x\right)$$

$$= \boxed{-2x^2\cos(x) + 2\cos(x) - 4x\sin(x)}$$

   (b) $g(x) = \frac{1}{x} = x^{-1}$

$$g'(x) = (-1)x^{-1-1}$$

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

(c) $f(x) = (x^2 - 1)(x^2 + 1)$

$$= x^4 - 1$$

$$f'(x) = \frac{d}{dx}[x^4] - \frac{d}{dx}[1]$$

$$= \boxed{4x^3}$$

(d) $g(x) = \frac{e^{2x}}{x^2}$ quotient. chain.

$$g'(x) = \frac{x^2 \frac{d}{dx}[e^{2x}] - e^{2x} \frac{d}{dx}[x^2]}{(x^2)^2}$$

$$= \frac{x^2 \cdot e^{2x} \cdot \frac{d}{dx}[2x] - e^{2x} \cdot 2x}{x^4}$$

$$= \frac{2x^2 e^{2x} - 2xe^{2x}}{x^4}$$

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

$$= \boxed{\frac{2e^{2x}(x-1)}{x^3}}$$