

**Practice Test A for Midterm Exam 2**

**Instructions:** This optional exam is for practice, to give you an idea of what our in-class midterm exam will be like. I'd recommend that you try taking it in exam conditions: 50 minutes, closed-book.

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1. **(36 points)** Compute the following derivatives by any legal method.

- (a).  $f'(x)$ , where  $f(x) = \tan(5x^2 - 8)$ .      (b).  $\frac{d}{dt} \left( (1 - t^4)\sqrt{\cos t} \right)$ .  
(c).  $y'$ , where  $xy + y^3 = 4x^2$ .      (d).  $g'(x)$ , where  $g(x) = \frac{x^2 + 3x}{x + 1}$ .  
(e).  $h''(x)$ , where  $h(x) = \frac{x^3 + 4}{\sqrt{x}}$ .

2. **(14 points)** Suppose  $f, g, h$  are functions such that

$$f(2) = 4, \quad f'(2) = -3, \quad g(1) = 2, \quad g'(1) = 5, \quad h(1) = 7, \quad h'(1) = -2.$$

Let  $F(x) = f(g(x))$  and  $G(x) = g(x) \cdot h(x)$ . Compute  $F'(1)$  and  $G'(1)$ .

3. **(20 points)** A state trooper is parked on a North-South road 60 meters from where it intersects an East-West road. Meanwhile, a truck is driving along the East-West road. At the moment the truck is 80 meters past the intersection, the trooper (using his radar gun) sees that the truck's distance from him is increasing at 12 m/sec. How fast is the truck actually going at that time?

4. **(18 points)** Let  $g(x) = \frac{x + 4}{x^2 + 9}$ .

Find the absolute minimum and absolute maximum values of  $g$  on the interval  $[-4, 4]$ .

5. **(12 points)** Let  $f(x) = \sin^3(4x) + \sec(4x) - 8 \sin(2x)$ . Compute  $f' \left( \frac{\pi}{12} \right)$ . Simplify.