Math 111-01, Fall 2022 Professor Rob Benedetto

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). $\dfrac{d}{dt}\Big((1-t^4)\sqrt{\cos t}\Big)$.

   (c). y', where $xy + y^3 = 4x^2$.

   (d). $g'(x)$, where $g(x) = \dfrac{x^2+3x}{x+1}$.

   (e). $h''(x)$, where $h(x) = \dfrac{x^3+4}{\sqrt{x}}$.

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 $g(x) = \dfrac{x+4}{x^2+9}$.
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 $f'\left(\dfrac{\pi}{12}\right)$. Simplify.