

Math 180, Quiz 7: Thursday, March 14, 2013

Take fifteen minutes to complete this quiz. Please show all your work, and write your name on the front *and* back of the paper before turning it in. Make sure to show all relevant work.

1. (4 pts) Find the absolute minimum and maximum of $f(x) = \frac{2x^2 + 3x}{3x^2 - 9}$ on the interval $\left[-\frac{3}{2}, 1\right]$.

2. (5 pts) A patient comes into the emergency room with a myocardial infarction. You administer nitroglycerin as a vasodilator, causing the radii of the blood vessels to increase by 2% per minute. The Hagen-Poiseuille equation from fluid dynamics tells us that the blood flow through a vessel is directly proportional to the fourth power of its radius. The flow must increase by at least 5% per minute or your patient will die. What happens?

(Hints: You're given r'/r and need to find Q'/Q , where Q is the blood flow. You know that $Q = kr^4$ for some constant k . Don't worry about whether you've seen a problem like this before, just start doing the calculations and see what happens. Guessing whether the patient lives or dies without any support will not earn much credit.)

3. (1 pt) Suppose f and f^{-1} are differentiable functions, and that you are given the values

x	$f(x)$	$f'(x)$
0	$3/2$	$1/2$
1	2	$1/2$
$3/2$	$19/8$	1
2	3	$3/2$
$5/2$	$31/8$	2
3	5	$5/2$

What is $(f^{-1})'(3/2)$? (Show at least enough work that I can tell you didn't just make a lucky guess!)