Math 124 F Autumn 2012
Mid-Term Exam Number One
October 23, 2012
Answers

There were two versions of the exam.
Version A: The limit in problem 1(a) involved $x \to -7$.

1. (a) $\frac{9}{11}$ (b) $-\infty$ (c) $\frac{3}{2}$ (d) $\sqrt{\frac{3}{2}}$
2. (a) $f'(x) = (10x^4 + 1)(x^2 - x - 2) + (2x^5 + x + 1)(2x - 1)$
   (b) $g'(x) = \dfrac{(1 + \cos x)(e^x + \tan x) - (x + \sin x)(e^x + \sec^2 x)}{(e^x + \tan x)^2}$
   (c) $h'(x) = 8(x + \csc x)^7(1 - \csc x \cot x) - \dfrac{3}{2}x^{-3/2}$
   (d) $j'(x) = -\sin\left(\cot x + x^2 + e^{\sec x}\right)\left(-\csc^2 x + 2x + e^{\sec x}\sec x \tan x\right)$
3. (a) 5.1424187236 km/hr (b) 5.5055858371 km/hr
4. $k = 3/2$ is the only value.
5. $6x - 3h - 15$
6. $a = \dfrac{-1 \pm \sqrt{3}}{2}$

Version B: The limit in problem 1(a) involved $x \to -5$

1. (a) $\frac{1}{2}$ (b) ∞ (c) $\frac{1}{2}$ (d) $\frac{5}{\sqrt{3}}$
2. (a) $f'(x) = (10x - 6)(x^2 + 3x - 2) + (5x^2 - 6x + 1)(2x + 3)$
   (b) $g'(x) = \dfrac{(\cos x + e^x)(x + \tan x) - (\sin x + e^x)(1 + \sec^2 x)}{(x + \tan x)^2}$
   (c) $h'(x) = 5(x + \cot x)^4(1 - \csc^2 x) - \dfrac{2}{3}x^{-4/3}$
   (d) $j'(x) = \cos\left(\csc x + x^3 + e^{\sec x}\right)\left(-\csc x \cot x + 3x^2 + e^{\sec x}\sec x \tan x\right)$
3. (a) 4.71019494783 km/hr (b) 4.608176875690 km/hr
4. $k = -1/2$ is the only value.
5. $6x + 3h - 9$
6. $a = \dfrac{1 \pm \sqrt{7}}{-3}$