Math 124 C - Spring 2010
Mid-Term Exam Number One
April 27, 2010
Answers

There were two versions of the exam.
Version A - The numerator of problem 1(a) is $x^3 - 25x$.

1. (a) $\frac{10}{3}$ (b) $\frac{3}{2}$ (c) $\frac{1}{5}$

2. (a) $f'(x) = 5x^4 - 12x^3 + 2\cos 2x$

   (b) $f'(x) = \dfrac{(3+e^x)(6+\tan x) - (3x+e^x)(\sec^2 x)}{(6+\tan x)^2}$

   (c) $f'(x) = 5x^4\cos(3x^2+x) + x^5(-\sin(3x^2+x)(6x+1))$

   (d) $f'(x) = -(x^2+\sec x)^{-2}(2x+\sec x\tan x)$

3. (a) $\frac{-25}{24} m/s$ (b) 3.83095 m.

4. $a = 3 \pm \dfrac{1}{2}\sqrt{26}$

5. (a) $\frac{1}{a}$ (b) $-a+1$

   (c) The function will be continous at $x = 0$ only if $\frac{1}{a} = -a+1$. However, this equation is equivalent to $a^2 - a + 1 = 0$, which has no real solutions, so there is no a which makes the function continuous everywhere.

6. $f(x) = -\frac{3}{2}x^2 + 7x - \frac{7}{2}$

Version B - The numerator of problem 1(a) is $x^3 - 16x$.

1. (a) $\frac{8}{5}$ (b) $\frac{7}{2}$ (c) $\frac{1}{2}$

2. (a) $f'(x) = 3x^2 - 6x + 3\cos 3x$

   (b) $f'(x) = \dfrac{(6+e^x)(5+\tan x) - (6x+e^x)(\sec^2 x)}{(5+\tan x)^2}$

   (c) $f'(x) = 4x^3\cos(4x^3+x) - x^4\sin(4x^3+x)(12x^2+1)$

   (d) $f'(x) = -(x^2+\sec x)^{-2}(2x+\sec x\tan x)$

3. (a) $\frac{-17}{15}$ m/s (b) 13.9687 m.

4. $a = 4 \pm \dfrac{1}{3}\sqrt{111}$

5. (a) $\frac{1}{a}$ (b) $-a+1$

   (c) The function will be continous at $x = 0$ only if $\frac{1}{a} = -a+1$. However, this equation is equivalent to $a^2 - a + 1 = 0$, which has no real solutions, so there is no a which makes the function continuous everywhere.

6. $f(x) = 3x^2 - 4x + 5$