

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

(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) $\frac{-17}{8}$ m/s (b) 3.83095 m.

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

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

(c) The function will be continuous 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) $f'(x) = \frac{(6 + e^x)(5 + \tan x) - (6x + e^x)(\sec^2 x)}{(5 + \tan x)^2}$

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

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

(c) The function will be continuous 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. $f(x) = 3x^2 - 4x + 5$