

Mth 251 Test 1x | **Winter 2008** | **Name:**

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Time: 50 min. Date: Feb 12 2008. Section: §040, CRN: 22861 Location: MLC, SSD, etc.

- Do not ignore these instructions!
- This is a make-up test. It is similar, but not identical, to the in-class test. A scantron is not required.
- This test consists of multiple-choice problems. Mark your answers on the test in the space provided. When you are done return the entire test. Do not turn in any other paper.
- Depending on your solution methods your answers may appear in a different form from the ones provided on the test. You are expected to be able to provide the appropriate manipulations to identify the correct answer.
- You may use one 8.5 × 11 inch note sheet prepared in advance. Note sheets may not be shared. If you do not bring a note sheet you will have to do without any help notes. You may not use any books, notebooks, additional note sheets nor note cards.
- You may use a simple scientific calculator or a modest graphics calculator on this test and you are expected to have one available. An overly elaborate calculator, laptop, handheld or notebook computer, or any device capable of extensive symbolic manipulation (other than your own brain) will not be allowed. Calculators and other equipment may not be shared.
- During the test be sure to check the board occasionally for corrections. Note $\log(x)$, $\ln(x)$ or $\log_e(x)$ means the natural logarithm of x . I will use $\log_{10}(x)$ to denote the logarithm base 10 of x .
- There are 10 multiple-choice problems worth 12 points each. The total number of points is 120 points.

Problem 1. Compute the limit

$$\lim_{x \rightarrow +\infty} \left(x^2 - \sqrt{x^4 - 2x^2 + x + 1} \right).$$

- A.)** 1 **B.)** 2
C.) $2\sqrt{2}$ **D.)** 4 **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 1).

Problem 2. If $f(x) = 2x^2 + x + 1$, $g(x) = 2x^2 + x - 2$ and $h = f \circ g$ then $h(x) =$

- A.)** $8x^4 + 8x^3 - 12x^2 - 7x + 7$ **B.)** $4x^4 + 4x^3 - x^2 - x - 2$
C.) $8x^4 + 8x^3 + 12x^2 + 5x + 1$ **D.)** $4x^4 + 4x^3 - 7x^2 - 7x + 7$
E.) None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 2).

Problem 3. If $f(x) = 2x^2 + x + 1$, $g(x) = 2x^2 + x - 2$ and $h = g \circ f$ then $h(x) =$

- A.)** $8x^4 + 8x^3 - 12x^2 - 7x + 7$ **B.)** $4x^4 + 4x^3 - x^2 - x - 2$
C.) $8x^4 + 8x^3 + 12x^2 + 5x + 1$ **D.)** $4x^4 + 4x^3 - 7x^2 - 7x + 7$
E.) None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 3).

Problem 4. If

$$f(x) = \frac{x^3}{1+x^2}$$

compute $f'(1)$.

- A.)** $\frac{1}{4}$ **B.)** $\frac{1}{3}$
C.) $\frac{1}{2}$ **D.)** 1 **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 4).

Problem 5. According to Galileo a body falling from rest near the Earth's surface falls a distance h meters in t seconds where

$$h = \frac{1}{2}gt^2$$

where g is the acceleration of gravity, about 9.8 m/sec^2 . According to Torricelli fluid flowing out of a tank through a hole in the tank flows out at the same speed as a particle would acquire falling from the surface of the liquid to the hole (a distance called the head). Compute the speed as a function of the head h .

- A.)** \sqrt{gh} **B.)** $\sqrt{2gh}$
C.) $2gh$ **D.)** gh **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 5).

Problem 6. Let

$$f(x) = \frac{\sin^3(x)}{\cos(x)}$$

Compute $f'(\pi/4)$.

- A.)** $\frac{\sqrt{2}}{4}$ **B.)** $\sqrt{2}$
C.) $\frac{1}{4}$ **D.)** $\frac{1}{2}$ **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 6).

Problem 7. A particle travels a distance $s(t)$ feet in t seconds. The jerk is the derivative of the acceleration. If $s(t) = t^4/20 + t^4/12 + t^3/6 + t^2$ find the jerk at time $t = 3$ seconds.

- A.)** 34 ft/sec³ **B.)** 40 ft/sec³
C.) 41 ft/sec³ **D.)** 32 ft/sec³ **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 7).

Problem 8. Compute

$$\frac{d}{dx} \frac{x}{\sqrt{x^2 + 1}}.$$

- A.)** $x^2(x^2 + 1)^{-\frac{1}{2}}$ **B.)** $x^2(x^2 + 1)^{-\frac{3}{2}}$
C.) $x(x^2 + 1)^{-\frac{3}{2}}$ **D.)** $(x^2 + 1)^{-\frac{3}{2}}$ **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 8).

Problem 9. Compute the derivative $\frac{d}{dx} \arctan\left(\frac{3}{\cos(x)}\right)$.

- A.)** $\frac{3 \sin(x)}{9 + \cos(x)}$ **B.)** $\frac{\sin(x)}{9 + \cos(x)}$
C.) $\frac{3 \sin(x)}{9 + \cos^2(x)}$ **D.)** $\frac{3 \sin(x)}{1 + 9 \cos^2(x)}$ **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 9).

Problem 10. Compute

$$e^{-\cos(\theta)} \frac{d^2}{d\theta^2} e^{\cos(\theta)}$$

- A.)** $\cos(\theta) - \sin(\theta)$ **B.)** $\sin^2(\theta)$
C.) $\sin^2(\theta) - \cos(\theta)$ **D.)** $\cos^2(\theta) - \sin(\theta)$ **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 10).

Use the backs of the test pages for scratch work.