Math 1225 **Common Final Exam** **Fall 2014**

Form A

Instructions: Please enter your NAME, ID Number, FORM DESIGNATION (A, B, or C), and your CRN on the op-scan sheet. The CRN should be written in the box labeled COURSE. Do not include the course number. Darken the appropriate circles below your ID number and below the Form designation letter. **Use a number 2 pencil**. Machine grading may ignore faintly marked circles.

Mark your answers to the test questions in rows 1–14 of the op-scan sheet. Your score on this test will be the number of correct answers. You have one hour to complete this portion of the exam. Turn in the op-scan sheet with your answers, this exam and all scrap paper at the end of this part of the final exam.

Exam Policies: You may not use a book, notes, a formula sheet, a calculator, or a computer. Giving or receiving unauthorized aid is an Honor Code Violation.

Signature: _____

Name (printed): _____

Student ID #: _____

1. Find $\dfrac{d^2y}{dx^2}$ at $(2,2)$ if $x+y=xy$.

(A) $-\frac{1}{2}$ (B) 0 (C) 1 (D) 2

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2. If $4x^2 - x < g(x) < 4x^2 + 3x$ for all $x > 5$ then $\lim\limits_{x\to\infty} \dfrac{g(x)}{x^2}$ is equal to

(A) 0 (B) 3 (C) 4 (D) ∞

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3. How many inflection points does $f(x) = \dfrac{1}{20}x^5 - \dfrac{1}{6}x^4 + \pi x + 2$ have?

(A) 0 (B) 1 (C) 2 (D) 3

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4. Water flows out of a tank at the rate of $r(t) = 100 - 2t$ liters per minute, where $0 \le t \le 50$. How much water leaves the tank during the first 5 minutes?

(A) 25 liters (C) 475 liters

(B) 90 liters (D) 490 liters

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5. Starting with $x_1 = 0$, apply Newton's Method twice to approximate a root of $x^7 = 1 - x$. What is the value of x_3?

(A) $x_3 = -\frac{11}{8}$ (B) $x_3 = 0$ (C) $x_3 = \frac{7}{8}$ (D) $x_3 = 1$

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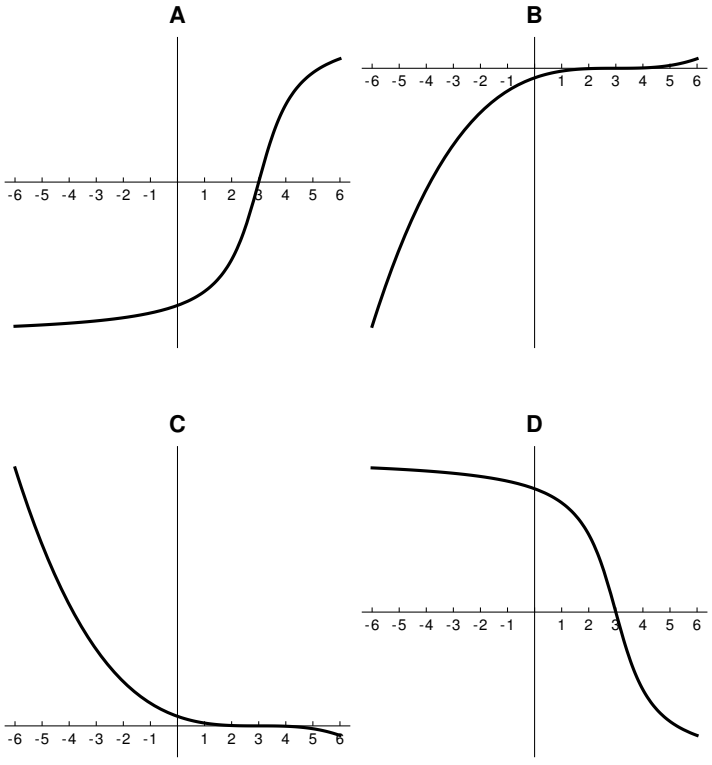
6. A function $f(x)$ satisfies the following conditions: $f''(-3) > 0$, $f''(5) < 0$, $f'(3) = 0$. Which of the following graphs could represent $f(x)$?



(A) A (B) B (C) C (D) D

7. If we apply the Mean Value Theorem to the function $f(x) = x^2 + x$ on the interval $[1, 5]$, what does it tell us?

(A) $f'(c) = 0$ for some $c \in (1, 5)$.

(B) $f'(c) = 7$ for some $c \in (1, 5)$.

(C) $f(c) = 0$ for some $c \in (1, 5)$.

(D) $f(c) = 7$ for some $c \in (1, 5)$.

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8. For which of the following functions is $L(x) = 3(x-1)+5$ the standard linear approximation at $x = 1$?

(A) $f(x) = x^3 + 5$

(B) $f(x) = \frac{3}{2}(x-1)^2 + 5x$

(C) $f(x) = \ln(x^3) + 5$

(D) None of these.

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9. Two parallel sides of a rectangle are being lengthened at a rate of 2 in/sec, while the other two sides are shortened in a way that the figure remains a rectangle with a constant area of 50 in^2. What is the rate of change of the perimeter when the length of an increasing side is 5 inches?

(A) -2 in/sec (B) -4 in/sec (C) 0 in/sec (D) 10 in/sec

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10. Evaluate the limit. (Hint: Try to rewrite it as a derivative).

$$\lim_{h \to 0} \frac{(2+h)^8 - 2^8}{h}$$

(A) 2^8 (B) 2^9 (C) 2^{10} (D) 2^{11}

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11. The region under the graph of which function has the area given by the following limit?

$$\lim_{n \to \infty} \sum_{i=1}^{n} \frac{4}{n} \sqrt{3 + \frac{4i}{n}}$$

(A) $f(x) = \frac{4}{x}\sqrt{3 + \frac{4}{x}}, \quad 0 \le x \le 1$

(B) $f(x) = 4x\sqrt{3 + 4x}, \quad 0 \le x \le 1$

(C) $f(x) = \sqrt{x}, \quad 3 \le x \le 4$

(D) $f(x) = \sqrt{x}, \quad 3 \le x \le 7$

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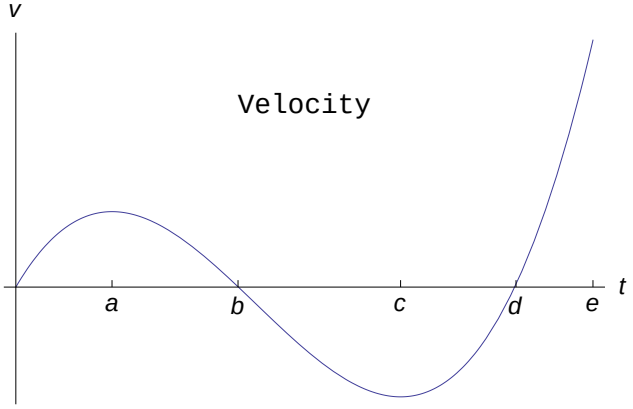
12. The graph of the *velocity* function of a particle is shown below. When is the particle speeding up?



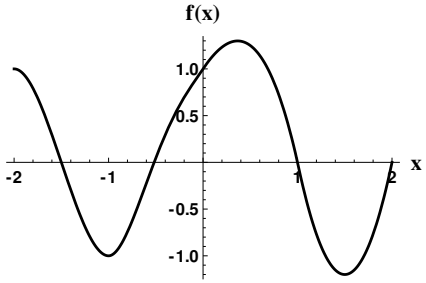
(A) $(0, b)$ and (d, e) only

(B) $(0, a)$, (b, c) and (d, e) only

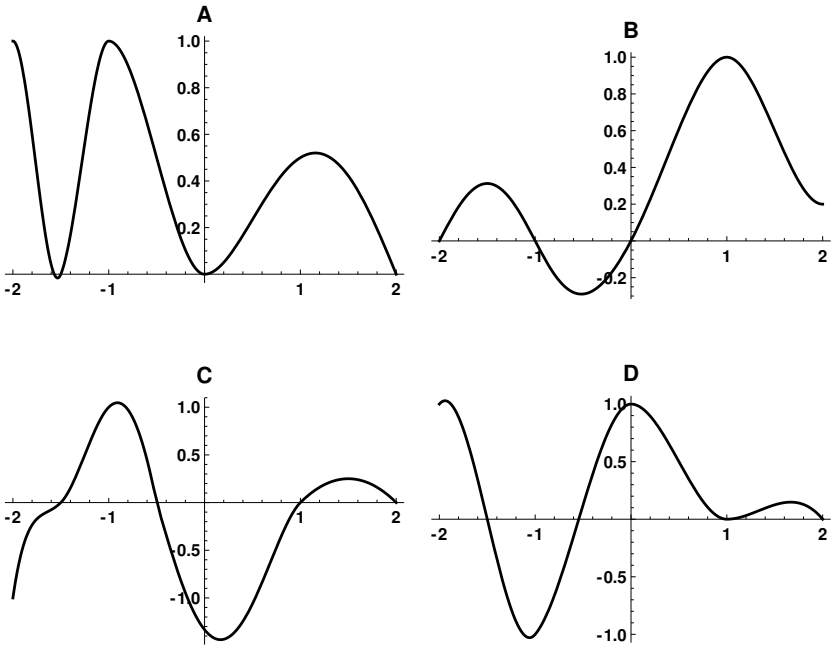
(C) $(0, a)$ and (d, e) only

(D) (a, c) only

13. The graph of a function $f(x)$ is shown below.



Which of the following could be the graph of an antiderivative of $f(x)$?



(A) A (B) B (C) C (D) D

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14. The integral $\displaystyle\int_2^5 \frac{x}{4+x^2}\,dx$ is equal to which limit?

(A) $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\frac{3}{n}\left(\frac{2+\frac{3i}{n}}{4+(2+\frac{3i}{n})^2}\right)$

(B) $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\frac{3}{n}\left(\frac{\frac{3i}{n}}{4+(\frac{3i}{n})^2}\right)$

(C) $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\frac{5}{n}\left(\frac{2+\frac{5i}{n}}{4+(2+\frac{5i}{n})^2}\right)$

(D) $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\frac{3i}{n}\left(\frac{2+\frac{3i}{n}}{4+(2+\frac{3i}{n})^2}\right)$