

### PROBLEMS IN PRACTICE TEST 3

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1. If  $S$  is a plane in Euclidean 3-space containing  $(0, 0, 0)$ ,  $(2, 0, 0)$  and  $(0, 0, 1)$ , then  $S$  is the

- (A)  $xy$ -plane
  - (B)  $xz$ -plane
  - (C)  $yz$ -plane
  - (D) plane  $y - z = 0$
  - (E) plane  $x + 2y - 2z = 0$
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2. If  $a$  and  $b$  are real numbers, which of the following are necessarily true?

- I. If  $a < b$  and  $ab \neq 0$ , then  $\frac{1}{a} > \frac{1}{b}$ .
- II. If  $a < b$ , then  $ac < bc$ , for all real numbers  $c$ .
- III. If  $a < b$ , then  $a + c < b + c$ , for all real numbers  $c$ .
- IV. If  $a < b$ , then  $-a > -b$ .

Choose one of these answers:

- (A) I only
  - (B) I and III only
  - (C) III and IV only
  - (D) II, III and IV only
  - (E) I,II,III and IV
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3.  $\int_0^1 \int_0^x xy \, dy \, dx =$

- (A) 0
  - (B)  $1/8$
  - (C)  $1/3$
  - (D) 1
  - (E) 3
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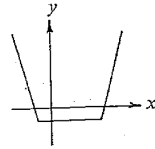
4. For  $x \geq 0$ ,  $\frac{d}{dx}(x^e \cdot e^x) =$
- (A)  $x^e \cdot e^x + x^{e-1}e^{x+1}$
  - (B)  $x^e \cdot e^x + x^{e+1}e^{x-1}$
  - (C)  $x^e \cdot e^x$
  - (D)  $x^{e-1}e^{x+1}$
  - (E)  $x^{e+1}e^{x-1}$
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5. All functions  $f$  defined on the  $xy$ -plane such that

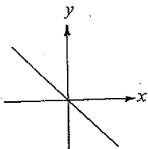
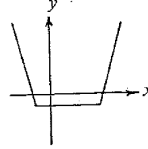
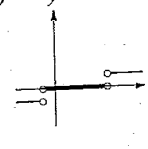
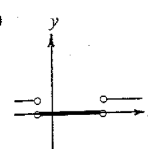
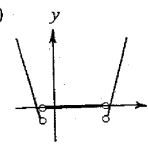
$$\frac{\partial}{\partial x}[f(x, y)] = 2x + y \quad \text{and} \quad \frac{\partial}{\partial y}[f(x, y)] = x + 2y$$

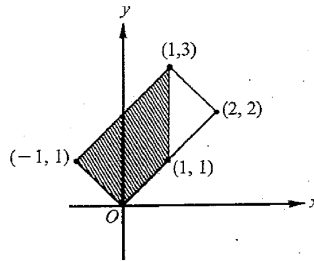
are given by  $f(x, y) =$

- (A)  $x^2 + xy + y^2 + C$
  - (B)  $x^2 - xy + y^2 + C$
  - (C)  $x^2 - xy - y^2 + C$
  - (D)  $x^2 + 2xy + y^2 + C$
  - (E)  $x^2 - 2xy + y^2 + C$
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6. Which of the following could be the graph of the derivative of the function whose graph is shown in the figure above?

- (A)  (B)  (C) 
- (D)  (E) 



7. Which of the following integrals represents the area of the shaded portion of the rectangle shown in the figure above?

- (A)  $\int_{-1}^1 (x + 2 - |x|) dx$  (B)  $\int_{-1}^1 (|x| + x + 2) dx$  (C)  $\int_{-1}^1 (x + 2) dx$   
 (D)  $\int_{-1}^1 |x| dx$  (E)  $\int_{-1}^1 2 dx$

8. 
$$\sum_{n=1}^{\infty} \frac{n}{n+1} =$$

(A)  $\frac{1}{e}$

(B)  $\log 2$

(C) 1

(D)  $e$

(E)  $+\infty$ 

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