



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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48. Let  $V$  be the set of all real polynomials  $p(x)$ . Let transformations  $T, S$  be defined on  $V$  by  $T:p(x) \rightarrow xp(x)$  and  $S:p(x) \rightarrow p'(x) = \frac{d}{dx}p(x)$ , and interpret  $(ST)(p(x))$  as  $S(T(p(x)))$ . Which of the following is true?
- (A)  $ST = 0$   
(B)  $ST = T$   
(C)  $ST = TS$   
(D)  $ST - TS$  is the identity map of  $V$  onto itself.  
(E)  $ST + TS$  is the identity map of  $V$  onto itself.
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49. If the finite group  $G$  contains a subgroup of order seven but no element (other than the identity) is its own inverse, then the order of  $G$  could be
- (A) 27                      (B) 28                      (C) 35                      (D) 37                      (E) 42
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50. In a game two players take turns tossing a fair coin; the winner is the first one to toss a head. The probability that the player who makes the first toss wins the game is
- (A)  $\frac{1}{4}$                       (B)  $\frac{1}{3}$                       (C)  $\frac{1}{2}$                       (D)  $\frac{2}{3}$                       (E)  $\frac{3}{4}$
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51. Let  $x_1 = 1$  and  $x_{n+1} = \sqrt{3 + 2x_n}$  for all positive integers  $n$ . If it is assumed that  $\{x_n\}$  converges, then  $\lim_{n \rightarrow \infty} x_n =$
- (A)  $-1$                       (B)  $0$                       (C)  $\sqrt{5}$                       (D)  $e$                       (E)  $3$
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