

10.  $\int_1^{\infty} x^{-\frac{5}{4}} dx$  is

- (A) 4      (B)  $\frac{5}{4}$       (C)  $\frac{1}{4}$       (D)  $-4$       (E) divergent

Answer

11. A function  $f$  is continuous on the closed interval  $[4,6]$  and twice differentiable on the open interval  $(4,6)$ . If  $f'(5) = -3$ , and  $f$  is concave downwards on the given interval, which of the following could be a table of values for  $f$ ?

(A) 

$x$	$f(x)$
4	8
5	4
6	0

(B) 

$x$	$f(x)$
4	8
5	6
6	2

(C) 

$x$	$f(x)$
4	8
5	6
6	5

(D) 

$x$	$f(x)$
4	6
5	4
6	2

(E) 

$x$	$f(x)$
4	8
5	3
6	2

Answer

12. The equation of the line tangent to the curve  $y = \frac{kx + 8}{k + x}$  at  $x = -2$  is  $y = x + 4$ .  
What is the value of  $k$ ?

(A)  $-3$       (B)  $-1$       (C)  $1$       (D)  $3$       (E)  $4$

Answer

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$x$	5	6	9	11	12
$f(x)$	10	7	11	12	8

13. A function  $f$  is continuous on the closed interval  $[5, 12]$  and differentiable on the open interval  $(5, 12)$  and  $f$  has the values given in the table above. Using the subintervals  $[5, 6]$ ,  $[6, 9]$ ,  $[9, 11]$ , and  $[11, 12]$ , what is the right Riemann sum approximation to  $\int_5^{12} f(x) dx$ ?

(A) 64      (B) 65      (C) 66      (D) 68.5      (E) 72

Answer

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14.  $\sum_{k=0}^{\infty} \left(-\frac{\pi}{3}\right)^k$  is

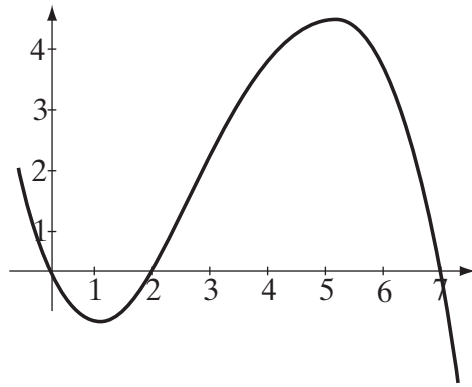
- (A)  $\frac{1}{1-\frac{\pi}{3}}$       (B)  $\frac{\frac{\pi}{3}}{1-\frac{\pi}{3}}$       (C)  $\frac{1}{1+\frac{\pi}{3}}$       (D)  $\frac{\frac{\pi}{3}}{1+\frac{\pi}{3}}$       (E) divergent

Answer

15. The following statements concerning the location of an extreme value of a twice-differentiable function,  $f$ , are all true. Which statement also includes the correct justification?

- (A) The function has a maximum at  $x = 5$  because  $f'(5) = 0$ .
- (B) The function has a maximum at  $x = 5$  because  $f'(x) < 0$  for  $x < 5$  and  $f'(x) > 0$  for  $x > 5$ .
- (C) The function has a minimum at  $x = 3$  because the tangent line at  $x = 3$  is horizontal.
- (D) The function has a minimum at  $x = 3$  because  $f'(x) < 0$  for  $x < 3$  and  $f'(x) > 0$  for  $x > 3$ .
- (E) The function has a minimum at  $x = 3$  because  $f''(3) < 0$ .

Answer

Graph of  $f$ 

16. The graph of a differentiable function  $f$  is shown above. The graph has a relative minimum at  $x = 1$  and a relative maximum at  $x = 5$ . Let  $g$  be the function defined by  $g(x) = \int_0^x f(t) dt$ . For what value of  $x$  does the graph of  $g$  change from concave up to concave down?

(A) 0      (B) 1      (C) 2      (D) 5      (E) 7

Answer