1 B, 2 C, 3 D, 4 C, 5 B, 6 B, 7 A, 8 A, 9 D, 10 B, 11 B, 12 C.

13 (a) \( \lambda_n = (2n - 1)^2 \), \( X_n = \cos[(2n - 1)x] \), \( n = 1, 2, 3, \ldots \), (b) No

14 (a) — (b) 0, (c) at \( x = -7 \): to 0, at \( x = 15 \): to -1.75

(d) —

(e) T, (f) 2

15 (a) The endpoints are insulated, (b) T, (c) 28/15
(Note: It is the constant term of the particular solution, which can be found directly by calculating the constant term of the given initial condition, as expanded into a Fourier cosine series of period 4.)

16 (a) The endpoints are kept at constant temperatures, (b) The general solution is: \( u(x, t) = v(x) + w(x, t) \) where \( v(x) = -5x + 30 \), \( w(x, t) = \sum_{n \geq 1} C_n e^{-\pi^2 n^2 t/9} \sin \left( \frac{n\pi}{3} x \right) \)
and
\[ C_n = \int_0^5 [u(x, 0) - v(x)] \sin \left( \frac{n\pi}{3} x \right) \, dx; \]

The particular solution is:
\[ u(x, t) = -5x + 30 + 8e^{-4\pi^2 t} \sin(2\pi x) - 20e^{-9\pi^3 t} \sin(3\pi x), \]
(c) 25, (d) 40.

17 (a) F, (b) 4/3, (c) T, (d) (2), (e) \( \alpha = 2/5, \beta = 5, \gamma = \pi n/5, F = \text{sine} \), (f) T.