

Multiple-Choice Test – Newton’s Divided Difference Polynomial Method
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1. If a polynomial of degree n has $n+1$ zeros, then the polynomial is
(A) oscillatory
(B) zero everywhere
(C) quadratic
(D) not defined

2. The following x, y data is given.

x	15	18	22
y	24	37	25

The Newton’s divided difference second order polynomial for the above data is given by

$$f_2(x) = b_0 + b_1(x-15) + b_2(x-15)(x-18)$$

The value of b_1 is most nearly

- (A) -1.0480
(B) 0.14333
(C) 4.3333
(D) 24.000
3. The polynomial that passes through the following x, y data

x	18	22	24
y	?	25	123

is given by

$$8.125x^2 - 324.75x + 3237, \quad 18 \leq x \leq 24$$

The corresponding polynomial using Newton’s divided difference polynomial is given by

$$f_2(x) = b_0 + b_1(x-18) + b_2(x-18)(x-22)$$

The value of b_2 is most nearly



- (A) 0.25000
- (B) 8.1250
- (C) 24.000
- (D) not obtainable with the information given

4. Velocity vs. time data for a body is approximated by a second order Newton's divided difference polynomial as

$$v(t) = b_0 + 39.622(t - 20) + 0.5540(t - 20)(t - 15), \quad 10 \leq t \leq 20$$

The acceleration in m/s^2 at $t = 15$ is

- (A) 0.5540
 - (B) 39.622
 - (C) 36.852
 - (D) not obtainable with the given information
5. The path that a robot is following on a $x - y$ plane is found by interpolating the following four data points as

x	2	4.5	5.5	7
y	7.5	7.5	6	5

$$y(x) = 0.1524x^3 - 2.257x^2 + 9.605x - 3.900$$

The length of the path from $x = 2$ to $x = 7$ is

- (A) $\sqrt{(7.5 - 7.5)^2 + (4.5 - 2)^2} + \sqrt{(6 - 7.5)^2 + (5.5 - 4.5)^2} + \sqrt{(5 - 6)^2 + (7 - 5.5)^2}$
- (B) $\int_2^7 \sqrt{1 + (0.1524x^3 - 2.257x^2 + 9.605x - 3.900)^2} dx$
- (C) $\int_2^7 \sqrt{1 + (0.4572x^2 - 4.514x + 9.605)^2} dx$
- (D) $\int_2^7 (0.1524x^3 - 2.257x^2 + 9.605x - 3.900) dx$



6. The following data of the velocity of a body is given as a function of time.

Time (s)	0	15	18	22	24
Velocity (m/s)	22	24	37	25	123

If you were going to use quadratic interpolation to find the value of the velocity at $t = 14.9$ seconds, the three data points of time you would choose for interpolation are

- (A) 0, 15, 18
- (B) 15, 18, 22
- (C) 0, 15, 22
- (D) 0, 18, 24

