

Algebra Assignment

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iii] Percentage error

x	$f(x) = \log(x)$
4.0	0.60206
4.5	0.6532125
5.5	0.7403627
6.0	0.7781513

x	4	6
$f(x)$	0.60206	0.7781513

$$\log(5) = f(x_k) = \frac{(x_k - x_1)(x_k - x_2)(x_k - x_3)}{(x_0 - x_1)(x_0 - x_2)(x_0 - x_3)} \times f(x_0)$$

$$\log(5) = \frac{(5-4)(5-6)}{(4-6)} \times 0.60206$$

$$\log(5) = \frac{(5-6)(5-4)}{(4-6)(6-4)} \times 0.60206$$

$$= 0.30103 \times 0.150515$$

x	4.5	5.5
$f(x)$	0.6532125	0.7403627

$$\log(5) = \frac{.}{4.}$$

Q2. a) $x = 4 \quad 6$
 $f(x) = 0.60206 \quad 0.7781513$

$$\log(5) = \frac{5-6}{4-6} \times 0.60206$$

$$+ \frac{5-4}{6-4} \times 0.7781513$$

$$= 0.69010565$$

b) $x = 4.5 \quad 5.5$
 $f(x) = 0.6532125 \quad 0.7403627$

$$\log(5) = \frac{5-5.5}{4.5-5.5} \times 0.6532125$$

$$+ \frac{5-4.5}{5.5-4.5} \times 0.7403627$$

$$= 0.6967876$$

Q3. $x^4 - x - 10 = 0$

$f(x) = x^4 - x - 10$

x	y
1.5	-6.4375
1.6	-5.0464
1.7	-3.3479
1.8	-1.3024
1.9	1.1321
2	4

$x_1 = 1.8 \quad y_1 = -1.3024$

$x_2 = 1.9 \quad y_2 = 1.1321$

$x_3 = \frac{1.8 + 1.9}{2} = 1.85$

$y_3 = 1.85^4 - 1.85 - 10$
 $= -0.13649375$

$$x_3 = 1.85$$

$$y_3 = -0.13649375$$

$$x_2 = 1.9$$

$$y_2 = 1.1321$$

$$x_4 = 1.875$$

$$y_4 = 0.4846191406$$

$$x_3 = 1.85$$

$$y_3 = -0.13649375$$

$$x_4 = 1.875$$

$$y_4 = 0.4846191406$$

$$x_5 = 1.8625$$

$$y_5 = 0.1708105713$$

$$x_3 = 1.85$$

$$y_3 = -0.13649375$$

$$x_5 = 1.8625$$

$$y_5 = 0.1708105713$$

$$x_6 = 1.86125$$

$$y_6 = 0.139788883$$

$$x_3 = 1.85$$

$$y_3 = -0.13649375$$

$$x_6 = 1.86125$$

$$y_6 = 0.139788883$$

$$x_7 = 1.855625$$

$$y_7 = 0.000493871$$

Q4.]

$$f(x) = x^3 - x - 12$$

$$f'(x) = 3x^2 - 1$$

$$x$$

$$f(x)$$

$$0$$

$$8 - 1$$

$$1$$

$$8 - 1$$

$$2$$

$$8 - 5$$

$$x_0 = 2$$

$$f(x_0) = 5$$

$$f'(x_0) = 11$$

$$x_1 = 2 - \frac{5}{11}$$

$$x_1 = 1.5454545$$

$$f(x_1) = 1.145755069$$

$$f'(x_1) = 6.165289252$$

$$x_2 = 1.359614916$$

$$f(x_2) = 0.1537049349$$

$$f'(x_2) = 4.545658159$$

$$x_3 = 1.325801345$$

$$f(x_3) = -0.000000004624917$$

$$f'(x_3) = 4.273247619$$

$$x_4 = 1.324719049$$

$$f(x_4) = 0.000000465594$$

Q5.) $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Given - $A^2 = A$

$$7A - (1+A)^3$$

$$7 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \left\{ \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \right\}^3$$

$$\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix} - \left\{ \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} \right\}^3$$

$$\begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix} - \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

Q6.) $\begin{bmatrix} 1 & -1 & 2 \\ 4 & 0 & 6 \\ 0 & 1 & -1 \end{bmatrix} \times \begin{bmatrix} -6 & -1 & -6 \\ -4 & -1 & -2 \\ 4 & -1 & 4 \end{bmatrix}$

$$1(-6) + 1(-4) + 2(4)$$

27) $A = 8j - 9j$ $B = 7i - 9j$
 Scalar = $\vec{a} \cdot \vec{b}$
 $\vec{a} \cdot \vec{b} = 8(7) - 9(9)$
 $= -25$

28) $a = 101$
 $b = 998$
 $d = 3$
 $a_n = 101 + (n-1)3$
 $998 - 101 = (n-1)3$
 $n = 300$

$S_n = \frac{300}{2} [2 \times 101 + (300-1)3]$
 $= 164850$

29) $a_6 = 32 \Rightarrow ar^5 = 32$
 $a_8 = 128 \Rightarrow ar^7 = 128$
 $\frac{ar^5}{ar^7} = \frac{32}{128} \cdot \frac{1}{r^2}$
 $\frac{1}{r^2} = \frac{32}{128}$
 $r = 2$

30) $(4+3x)^5 = 4^5 + 5 \times 4^4 \times 3x + 10 \times 4^3 \times 3^2 x^2 + 10 \times 4^2 \times 3^3 x^3 + 5 \times 4 \times 3^4 x^4 + 3^5 x^5$
 $= 1024 + 120 \cdot 3840x^3 + 1920x^2 + 480x^3 + 60x^4 + 325$

33
 $3 \overline{)101}$
 $\underline{-9}$
 11
 $\underline{-9}$
 2
 330
 $3 \overline{)998}$
 $\underline{-9}$
 808
 $\underline{-6}$
 32
 $3 \overline{)103}$
 $\underline{-9}$
 13
 34
 $3 \overline{)104}$
 $\underline{-9}$
 14
 $\underline{-1}$



012]

$$A = \begin{bmatrix} 2 & -3 & 0 \\ 2 & -5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

$$A - \lambda I$$

$$\begin{bmatrix} 2-\lambda & -3 & 0 \\ 2 & -5-\lambda & 0 \\ 0 & 0 & 3-\lambda \end{bmatrix}$$

$$|A - \lambda I| = 0$$

$$(2-\lambda)(-5-\lambda)(3-\lambda) + 3(6-2\lambda) = 0$$

$$(2-\lambda)(-15-5\lambda-3\lambda+\lambda^2) + 18 - 12\lambda$$

$$-30 + 10\lambda - 6\lambda + 2\lambda^2 + 15\lambda - 5\lambda^2 + 3\lambda^2$$

$$-\lambda^3 + 18 - 12\lambda = 0$$

$$-\lambda^3 + 7\lambda - 12 = 0$$

$$\lambda^3 - 7\lambda - 12 = 0$$

$$13] f(x) = x^3 - 7x^2 + 8x - 3 \quad f'(x) = 3x^2 - 14x + 8$$

$$x_0 = 5$$

$$f(x_0) = -13$$

$$f'(x_0) = 55$$

$$x_1 = 5 - \left(\frac{-13}{55} \right) = 5.236$$

$$f(x_1) = -9.473$$

$$f'(x_1) = 16.943088$$

$$x_2 = 5.236 - \left(\frac{-9.473}{16.943088} \right)$$

$$= 5.7951$$

$$\begin{aligned}
 (1-x+x^2)^4 &= (x^2 - (x-1))^4 \\
 &= (x^2)^4 - 4(x^2)^3(x-1) + 6(x^2)^2(x-1)^2 - 4(x^2)(x-1)^3 + (x-1)^4 \\
 &= x^8 - 4(x^6)(x-1) + 6(x^4)(x-1)^2 - 4(x^2)(x-1)^3 + (x-1)^4
 \end{aligned}$$

$$e^{-x} = 3 \log(x)$$

$$e^{-x} - 3 \log(x) = 0$$

$$x$$

$$f(x)$$

$$0.36788$$

$$2$$

$$-1.9441$$

$$x_0 = 1$$

$$f(x_0) = 0.36788$$

$$x_1 = 2$$

$$f(x_1) = -1.9441$$

$$x_2 = \frac{1+2}{2} = 1.5$$

$$x_1 = 1$$

$$f(x_1) = 0.36788$$

$$x_2 = 1.5$$

$$f(x_2) = -0.9933$$

$$x_3 = 1.25$$

$$f(x_3) = -0.3829$$

$$x_4 = 1$$

$$f(x_4) = 0.36788$$

$$x_4 = 1.125$$

$$f(x_4) = 0.0286$$

$$x_5 = 1$$

$$f(x_5) = 0.36788$$

$$x_5 = 1.0625$$