1) $r = 12.6\,cm$ $\quad r_a = 12.5\,cm$ $\quad$ Actual area $= \pi (r_a)^2 = 490.87385$

App area $= \pi r^2 = 502.72551\,cm^2$

i) abs error $11.58166\,cm^2$ $\quad$ ii) relative error $= \dfrac{11.58166}{490.87385}$ $\quad 0.024144$

iii) % error = Relative error $\times 100 = 2.4144\%$

2) i) $x_1 = 4 \quad y_1 = 0.60206$ $\quad (6-4) = (0.7781513 - 0.60206)$

$x_2 = 6 \quad y_2 = 0.7781513$ $\quad 2 = 0.1760913$

$1 = 0.08804565 \quad \therefore x = 5$

$y = 0.60206 + 0.08804565$

$\boxed{y = 0.69010565}$

ii) $x_1 = 4.5 \quad y_1 = 0.6532125$ $\quad (5.5 - 4.5) = (0.7403627 - 0.6532125)$

$x_2 = 5.5 \quad y_2 = 0.7403627$ $\quad 1 = 0.087502$

$y = \boxed{0.6967876} = y_1 + 0.043571$ $\quad 0.5 = 0.0437751 \quad \therefore x = 5$

3) $x^4 - x - 10 = 0$ $\quad x_0 = 1.5 \quad y_1 = -6.4375$

$x_1 = 2 \quad y_2 = 4$

$x_2 = \dfrac{x_0 + x_1}{2} = 1.75 \quad y_2 = -2.37109$

$x_3 = \dfrac{x_1 + x_2}{2} = 1.875 \quad y_3 = 0.48462$

$x_4 = \dfrac{x_2 + x_3}{2} = 1.8125 \quad y_4 = -1.02025$

$x_5 = 1.84375 \quad y_5 = -0.28773$

$\boxed{x_6 = 1.859375 \quad y_6 = 0.93378}$

5) $A^2 = A$ $\quad 7A - (I + A)^3$

$= 7A - (I + A^2(A) + 3A^2 I + 3AI^2) = 7A - I - 7A = -I$

6) $A = \begin{bmatrix} 1 & -1 & 2 \\ 4 & 0 & 6 \\ 0 & 1 & -1 \end{bmatrix}$ $\quad \boxed{|A| = -2}$ $\quad adj A = \begin{bmatrix} -6 & 1 & -6 \\ 4 & -1 & 2 \\ 4 & -1 & 4 \end{bmatrix}$

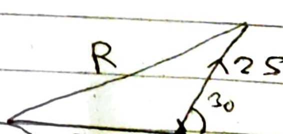
$\boxed{A^{-1} = \begin{bmatrix} 3 & -1/2 & 3 \\ -2 & 1/2 & -1 \\ -2 & 1/2 & -2 \end{bmatrix}} = \dfrac{1}{|A|} adj(A)$

7) $A = 8i - 9j \quad B = 7i - 9j$ $\quad a \cdot b = ab\cos\theta = 56 + 81 = 137$ $\quad a = \sqrt{145} \quad b = \sqrt{130}$

$\cos\theta = \dfrac{\vec{a} \cdot \vec{b}}{\sqrt{145}\sqrt{130}} = 0.99785$ $\quad \boxed{\theta = 3.75856^\circ}$

8) $\vec{R} = \vec{a} + \vec{b} = A^2 + B^2 + 2AB\cos\theta$

$= 75^2 + 25^2 + 2(75)(25)\cos 30 = \boxed{97.4556\,m}$



9) $d = 3$ $\quad AP \rightarrow 101, 104, 107, \ldots, 998$ $\quad a = 101$ $\quad 998 = 101 + (n-1)d$

$S_n = \dfrac{n}{2}(a + l) = \boxed{164850}$ $\quad \boxed{n = 300}$

10) $a_6 = 32$ $a_8 = 128$ find r

$\frac{ar^7}{ar^5} = \frac{128}{32} = 4$ $r = 2$

11) $(3x+4)^5 = 243x^5 + 1620x^4 + 4320x^3 + 5760x^2 + 3480x + 1024$ (Ans)

12) $A = \begin{bmatrix} 2 & -3 & 0 \\ 2 & -5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ $A - \lambda I = \begin{bmatrix} 2-\lambda & -3 & 0 \\ 2 & -5-\lambda & 0 \\ 0 & 0 & 3-\lambda \end{bmatrix}$

expand using 3rd row; $|A - \lambda I| = -\lambda^3 + 13\lambda - 12$ $\therefore \lambda^3 - 13\lambda + 12 = 0$

$a+b+c+d = 1-13+12 = 0$ $\therefore$ root 1

$\lambda^2 + \lambda - 12 = 0$ $(\lambda-3)(\lambda+4) = 0$ $\lambda = 3$ or -4

$\therefore$ eigen values are $-4, 3, 1$

14) $(1-x+x^2)^4 = ((x-1)^2 + x)^4$

$= (x-1)^8 + 4(x-1)^6 x + 6(x-1)^4 x^2 + 4(x-1)^2 x^3 + x^4$ (Ans)

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

$x_0 = 5$ $f(5) = -13$ $f'(5) = 13$ $x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 5 - \frac{(-13)}{13} = 6$

$f(x_1) = 9$ $f'(x_1) = 32$ $x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = 6 - \frac{9}{32} = 5.71875$

$f(x_2) = 0.84787$

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

x	y
0.5	−.29856
0.6	−.11673
0.7	+0.03188

$x_0 = 0.6$ $y_0 = -0.11673$

$x_1 = 0.7$ $y_1 = 0.03188$

$x_2 = 0.65$ $y_2 = -0.03921$

$x_3 = 0.675$ $y_3 = -0.00293$ $x_4 = 0.6875$ $y_4 = 0.01465$

$x_5 = 0.68125$ $y_5 = 0.0059$