WRITE COMMANDS TO SOLVE FOLLOWING USING MATLAB

I. Evaluate the following (Reduction equations) :

1. $\int_0^{\pi/2} \sin^{45}x \ dx$
2. $\int_0^{\pi/2} \sin^{90}x \ dx$
3. $\int_0^{\pi/2} \sin^{80} \cos^{100} x \ dx$
4. $\int_0^{\pi/2} \sin^{65}x \cos^{60} x \ dx$
5. $\int_0^{\pi/2} sin^{100}x \ cos^{75} x \ dx$
6. $\int_0^{\pi/2} sin^{75}x \ cos^{101}x \ dx$
7. $\int_0^{a} x\sqrt{ax - x^2} \ dx$
8. $\int_0^{\pi} x \ sin^7 x \ dx$
9. $\int_0^{\pi/2} cos^{60}x \ dx$
10. $\int_0^{2\pi} sin^2 \ x \ cos^4 x \ dx$
11. $\int_0^{\pi/4} sec^{60}x \ dx$
12. $\int_0^{\pi} sin^{20} \ x \ cos^{40}x \ dx$
13. $\int_0^{\pi/4} tan^{50}x \ dx$

II. Gamma Function :

1. $\Gamma(\frac{1}{2})$
2. $\Gamma(\frac{9}{4})$
3. $\Gamma(\frac{-1}{2})$
4. $\Gamma(\frac{3}{4})$
5. $\Gamma(\frac{-5}{2})$
6. $\int_0^{\infty} x^4 \ e^{-x} dx$
7. $\int_0^{\infty} x^2 e^{-2x^2} \ dx$
8. $\int e^{-\sqrt{x}} x^3 \ dx$

III. Beta Function :

1. $\beta(5,4)$ 2. $\beta(1/2, 3/2)$ 3. $\beta(1, 1/2)$

IV. Differentiation Under Integral Sign

1 . $\int_0^1 \frac{x^a - 1}{logx} \ dx$

2 . $\int_0^{\infty} \frac{dx}{x^2 + a^2}$

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3. $\int_0^1 x^m \, dx$

4. $\int_0^{\pi} \log(1 + a\cos x) \, dx$

5. $\int_0^{\infty} e^{-x} \frac{\sin ax}{x} \, dx$

V. Error Function: (Correct to three decimal places accuracy)

1. erf(0.3) 2.erf(0.5) 3. erf(0.8)

VI. Trace the following curves:

1. **Cartesian Explicit Curves:**

$1)\ a^2y^2 = x^2(2a - x)(x - a)$

$2)\ a^2x^2 = y^2(2a - y)$

$3)\ ay^2 = 4(x - 2a)$

$4)\ y^2(a - x) = x^3$

$5)\ 3ay^2 = x(x - a)^2$

$6)\ a^2y^2 = x^2(a^2 - x^2)$

$7)\ y(x^2 - 1) = (x^2 + 1)$

$8)\ (x^2 - a^2)(y^2 - b^2) = a^2b^2$

$9)\ x^2(x^2 - 4a^2) = y^2(x^2 - a^2)$

$10)\ x^2y^2 = a^2(y^2 - x^2)$

2. **Cartesian Implicit Curves:**

$1)\ x^3 + y^3 = 3axy$

$2)\ x^5 + y^5 = 5ax^2y^2$

$3)\ x^4 + y^4 = 4axy^2$

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4) $x^4 + y^4 = a^2(x^2 - y^2)$

5) $x^6 + y^6 = a^2x^2y^2$

6) $x^4 - y^4 + xy = 0$

7) $x^4 + y^4 = 2a^2xy$

8) $x^5 + y^5 = 5a^2x^2y$

3. Parametric Curves:

1) $x = a\cos^3\theta,\ \ y = b\sin^3\theta$

2) $x = a(\theta + \sin\theta),\ \ y = a(1 + \cos\theta)$

3) $x = a(\theta - \sin\theta),\ \ y = a(1 - \cos\theta)$

4) $x = a(\theta - \sin\theta),\ \ y = a(1 + \cos\theta)$

5) $x = a(\theta + \sin\theta),\ \ y = a(1 - \cos\theta)$

6) $x = t^2,\ \ y = t - \frac{t^3}{3}$

7) $x = at,\ \ y = \frac{a}{t^2}$

8) $x = a(\cos\theta + \frac{1}{2}\log\tan^2\frac{\theta}{2}),\ \ y = a\sin\theta)$

4. Polar Curves:

1) $r = \frac{a}{2}(1 + \cos\theta)$

2) $r = \frac{2a}{1 + \cos\theta}$

WRITE COMMANDS TO SOLVE FOLLOWING USING MATLAB

3) $r^2 = a^2 \cos 2\theta$

4) $r = \sqrt{2} + \cos\theta)$

5) $r = a(1 + \sqrt{2}\cos\theta)$

6) $r = a(\frac{\sqrt{3}}{2} + \cos\frac{\theta}{2})$

7) $r = a(1 + \sin\theta)$

8) $r = \frac{2a}{1 - \sin\theta}$

9) $r = a\cos 6\theta$

10) $r = a\sin 5\theta$

11) $r = a\cos 7\theta$

12) $r = a\sin 8\theta$

13) $r = ae^{m\theta}$

14) $r = a\theta$