1. Evaluate the following integrals.

1.1 $\int \left( \frac{1}{(2x-1)^2} + \frac{1}{(2x-1)} + 2^{2x-1} \right) dx$

1.2 $\int \frac{x+1}{\sqrt{2x+x^2}}\, dx$

1.3 $\int \frac{e^{\left(\frac{1}{x}+2\right)}}{x^2}\, dx$

1.4 $\int \frac{1}{\sqrt{x}} \text{cosec}(\sqrt{x}) \cot(\sqrt{x}) dx$

1.5 $\int \frac{1}{(3x-5)^2+9}\, dx$

1.6 $\int \cos(\cos\theta)\ \sin\theta\, d\theta$

2. $\int x\cos(9x)\, dx$

3. $\int x7^x \ln 7\, dx$

4. $\int \sin^2(5x)\cos^2(5x)\, dx$

5. $\int 2\sin(9\theta)\cos(2\theta) d\theta$

6. $\int \frac{\sqrt{4x^2+9}}{x^4}\, dx$ (Use substitution by Trigonometric functions.)

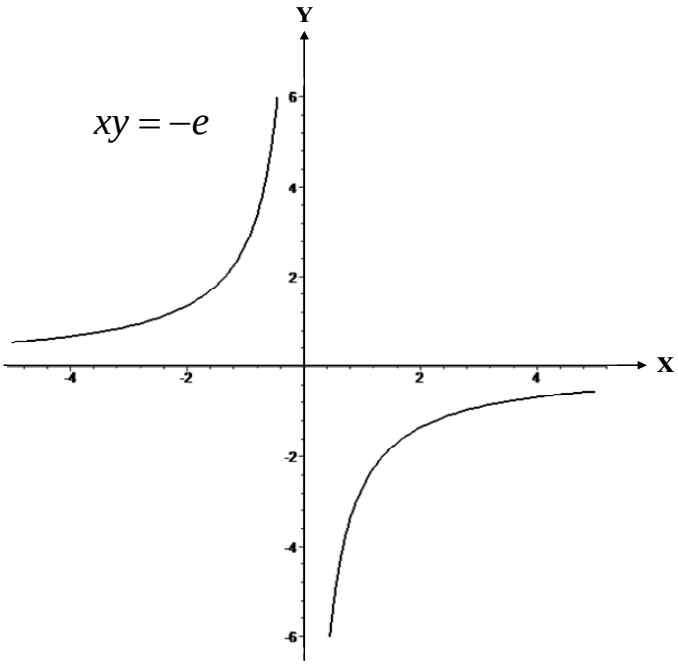
**7.** Decompose the rational functions below into partial fractions. **Do not solve for the unknown coefficients.**

7.1 $\frac{2x^3-2x^2+5x+1}{(x-1)^2(x^2+2)} =$ .....

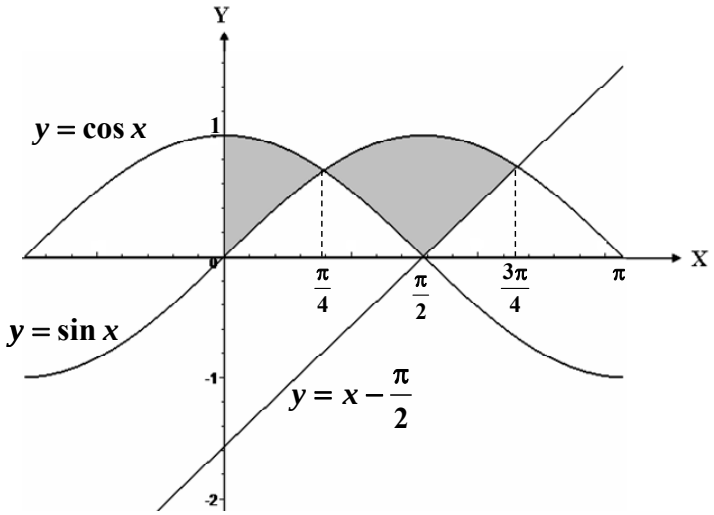
7.2 $\dfrac{2x^3-1}{x(x^2-2x+2)^2} =$ .....

8. Find $\int \dfrac{3x^2+2x+2}{(x-1)(x^2+2x+4)}\,dx$

9. Find the area between $xy=-e$ and y-axis for $2 \le y \le 5$.

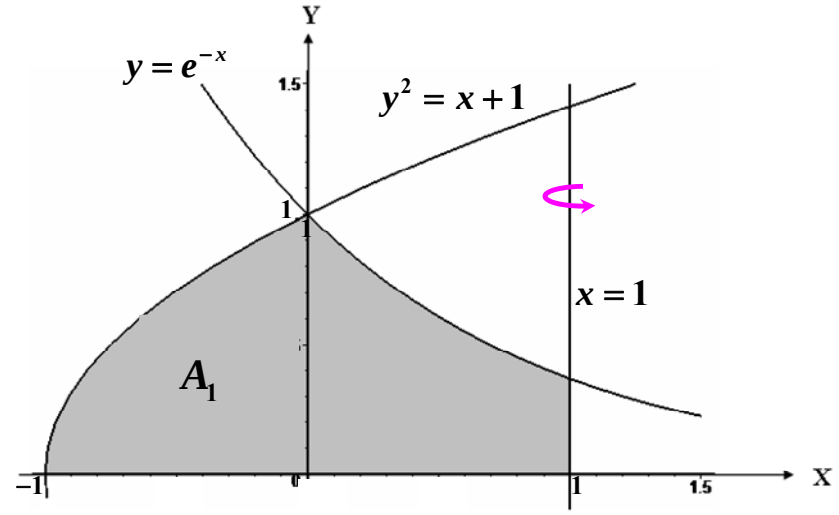


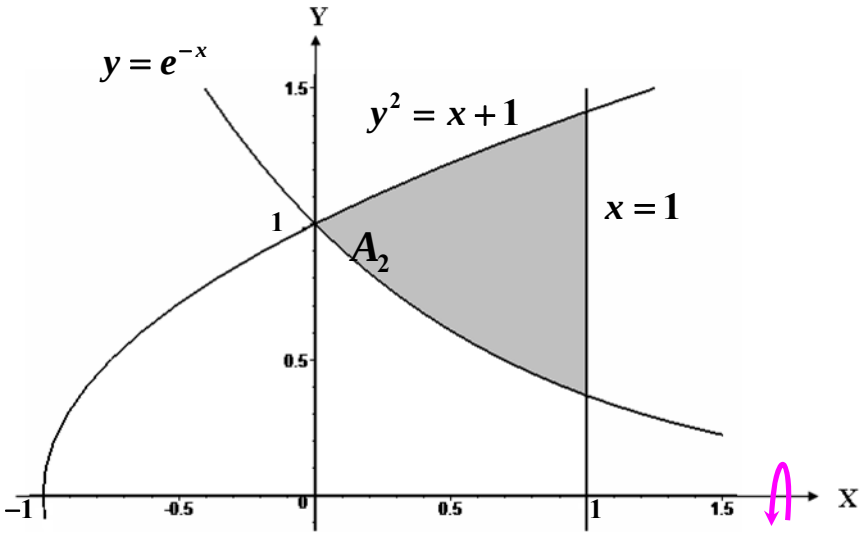

10. Set up an integral that represents the shaded region. **Do not evaluate the integral.**




Area = .....

11.




From the pictures above, set up an integral that represents the volume (V) of the solid of revolution.

11.1 Revolve $A_1$ about $x=1$

(Shell method) $V =$ .....

(Disk method) $V =$ .....

11.2 Revolve $A_2$ about $X$ -axis.

(Shell method) $V =$ .....

(Disk method) $V =$ .....

12. Find the arc length of $y = \frac{1}{3}(x^{\frac{3}{2}} - 3x^{\frac{1}{2}} + 2)$ from x = 0 to x = 1.

[ *Hint:* $\left(\frac{1}{2}\sqrt{x} + \frac{1}{2\sqrt{x}}\right)^2 = \frac{1}{4}x + \frac{1}{2} + \frac{1}{4x}$ ]

13. The table below gives values of f(x) at various points x.

| $x$ | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $f(x)$ | 0 | 0.1 | 0.18 | 0.26 | 0.34 | 0.41 | 0.47 | 0.53 | 0.59 | 0.64 | 0.69 |

| $x$ | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | 3 | 3.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $f(x)$ | 0.74 | 0.79 | 0.83 | 0.88 | 0.92 | 0.96 | 0.99 | 1.03 | 1.06 | 1.1 | 1.13 |

13.1 Use the trapezoidal method with n = 4 to approximate $\int_{1.2}^{2.8} f(x)\,dx$

13.2 Use the Simpson's rule to approximate $\int_{1}^{2.8} f(x)\,dx$ (Use n = 6.)

14. $\int_0^1 \frac{1}{\sqrt{1-x^2}}dx$

15. Rewrite the following improper integrals into limits. **Do not evaluate them.**

15.1 $\int_{-1}^{+\infty} \frac{1}{(x+2)\sqrt{x}} dx$

=……

15.2 $\int_{0}^{\frac{\pi}{2}} \frac{1}{x\cos x} dx$

=……