

1. Evaluate the following integrals.

$$1.1 \int \left(e^{\pi x} + \frac{4}{\sqrt{3-x^2}} + \frac{\ln 2}{x^2} \right) dx$$

$$1.2 \int e^{2x} (5 - e^{2x+1})^{10} dx$$

$$1.3 \int \frac{2^{(10+\ln x)}}{x} dx$$

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

$$1.5 \int \frac{\sec^2(2x)}{1 + \tan(2x)} dx$$

$$1.6 \int \frac{x}{9+x^4} dx$$

$$2. \int \sin(\ln x) dx$$

$$3. \int \sin^3(2x+1) \cos^2(2x+1) dx$$

$$4. \int (-5) \cos(15x) \cos(5x) dx$$

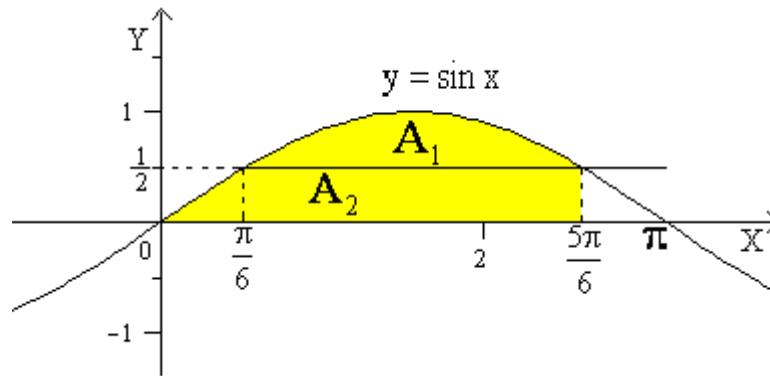
$$5. \int \frac{1}{(1-x^2)^{5/2}} dx$$

6. Decompose the rational function below in to partial fraction. **Do not solve for the unknown coefficients.**

$$\frac{x^2 - x + 1}{(x^2 + 2x + 2)^2 (1-x)(x+2)} = \dots\dots\dots$$

$$7. \int \frac{6x^2 - 6x - 71}{(x-3)^2(x+4)} dx$$

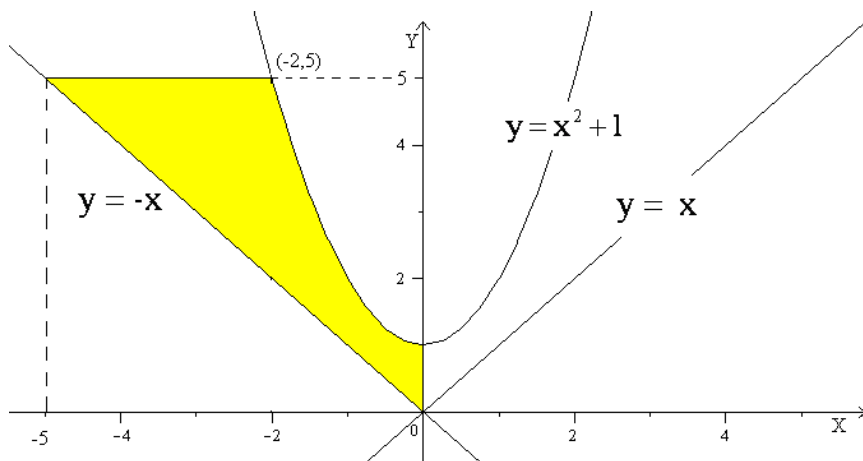
8. Set up an integral that represents the shaded region below. Do not evaluate the integral.



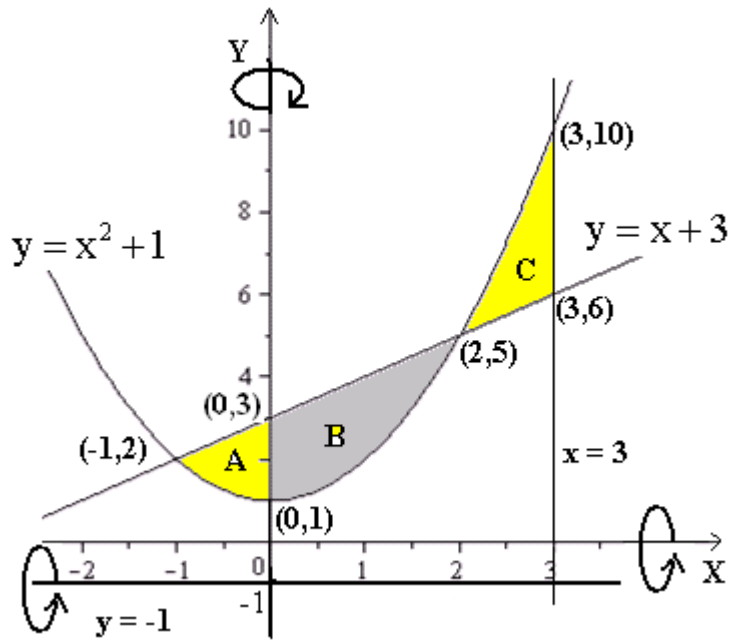
$A_1 =$

$A_2 =$

9. Find the area of the shaded region below.



10. Set up integral that represent the volumes for solids of revolution below. Do not evaluate the integrals.



10.1 Revolve the region A about the y-axis.

Use **disk** or **washer** method.

V =

Use **shell** method.

V =

10.2 Revolve $A \cup B$ about the line $y = -1$.

Use **disk** or **washer** method.

V =

10.3 From picture above, the volume (V) of the solid generated by revolving some region about the x-axis is given by:

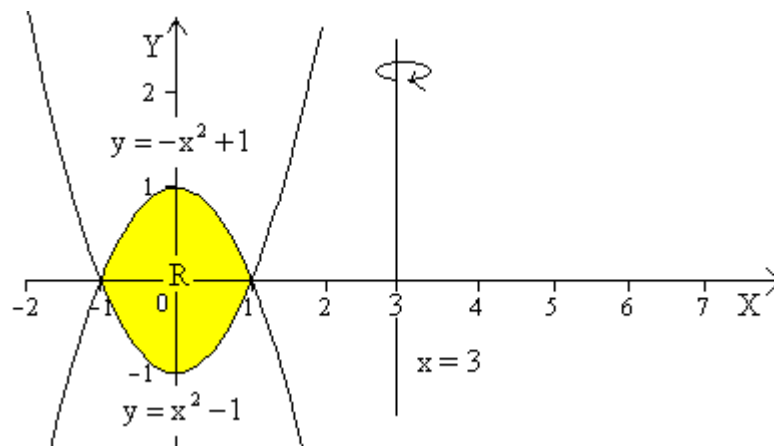
$$V = 2\pi \int_5^6 y \{ (y-3) - \sqrt{y-1} \} dy + 2\pi \int_6^{10} y \{ 3 - \sqrt{y-1} \} dy$$

(a) Which region (A, B, or C) generates the above volume?

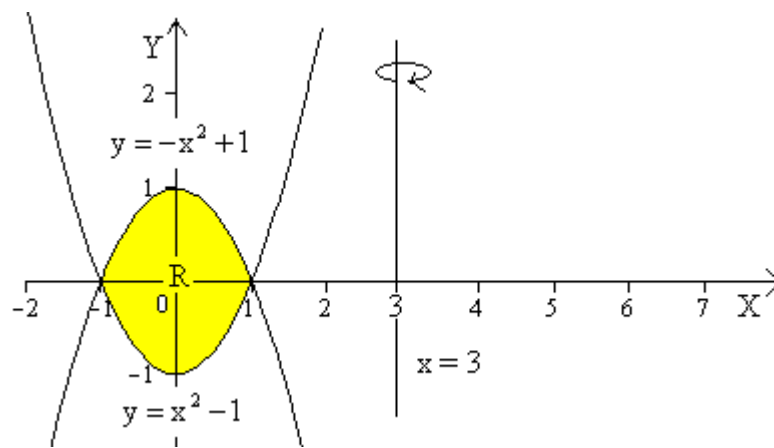
(b) Write the above volume (V) as an integral with respect to x. **Do not evaluate the integral.**

V =

12. Let R be the region enclosed by $y = -x^2 + 1$ and $y = x^2 - 1$ below.



12.1 Sketch a 3D solid generated by revolving R about the line $x = 3$.



12.2 Set up an integral representing the volume of the solid from 12.1. **Do not evaluate the integral.**

V =

13. Let $f(x) = x^{\frac{1}{x}}$ and $\sqrt{2} = 1.41$

13.1 Complete the table below. (Use 2 decimal places.)

x	$\frac{1}{2}$	1	$\frac{3}{2}$	2	$\frac{5}{2}$	3
f(x)	0.25		1.31		1.44	1.44

13.2 Use trapezoidal rule with $n = 2$ to approximate $\int_{0.5}^{2.5} f(x)dx$ (Use 2 decimal places.)

13.3 Use Simpson's rule with $n = 4$ to approximate $\int_{0.5}^{2.5} f(x)dx$ (Use 2 decimal places.)

14. Find the arc length of $y = -\sqrt{1-x^2}$ from (0,-1) to (1,0).

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

15.1 $\int_0^{+\infty} \frac{1}{x\sqrt{x}} dx =$ _____

15.2 $\int_0^{\frac{3\pi}{2}} \frac{1}{\cos x} dx =$ _____

16. $\int_0^1 x^3 \ln x dx$