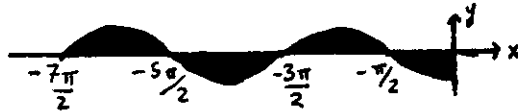


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Team Question 1.

Find the area of the shaded region.  $y = -\cos(x)$ .



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Team Question 2.

What is the range of the derivative of  $f(x) = \cos^2 x$ ?

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Team Question 3.

Evaluate  $\int \sec x \, dx$ .

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Team Question 4.

Let  $g(x) = d/dx \int_x^{x^2} \cos t \, dt$ .

What is  $g(0)$ ?

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Team Question 5.

At time  $t=0$  minutes, a parallelogram with an interior angle of  $60^\circ$  has sides that are 6" and 9" long. If the shorter sides' lengths are increasing at a constant rate of 1.5"/min. and the longer sides are increasing at a constant rate of 2"/min., then what is the rate of change in the area of the parallelogram (in sq.in./min.) at time  $t=2$  min.?

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Team Question 6.

If  $x(t) = 2t^3$ ,  $y(0)=4$ , and  $dy/dx = t^3+3/t^2$ ,  
what is  $y(2)$ ?

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Team Question 7.

Rotate the region bounded by  $y = -x^2 + 4x - 3$  and the x axis around the y axis. What is the volume of this solid?

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Team Question 8.

Evaluate  $\int 7/(121+x^2) dx$ .

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Team Question 9.

A car is moving 66 ft./sec. towards a wall that is 300 ft. away when the driver hits the brakes, causing a constant deceleration of 8 ft./sec. until the car stops. Does the car hit the wall? If not, how close to the wall does it come? If so, how fast is it going when it hits?

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Team Question 10.

Evaluate  $\int_1^e \ln x + 3(\ln x)^2 dx$ .

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Team Question 11.

Evaluate  $d/dx \sqrt[3]{\sin(4x + \sqrt{2x+17})}$ .

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Team Question 12.

Let  $f(x) = x^3 - 2x^2 - 15x + 3$ . Let  $g(x) = \int_0^x 3t/2 dt$ .

$$A = \int_1^2 12 f(x) dx.$$

$$B = f'(g(2)).$$

$$C = \int_2^4 g(x) dx.$$

What is  $A^2 + C$ ?