Review Problem Set 1

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Review : Integration

The value of the integral

$$\int_0^1 x^2\sqrt{1-x^2}\,dx$$

is

A. $\pi/4$
B. 1
C. $\pi/16$
D. $\pi/8$
E. $\pi/2$

Review: An application of integration

Does the curve

$$y = \int_0^{\sin x} e^{t^2}\, dt$$

have a horizontal tangent in the interval $[0, \pi]$?

A. Yes, at the point $x = 0$

B. No

C. Yes, at the apoint $x = \pi/4$

D. Yes, at the point $x = \pi/2$

Review: Riemann sums

Express the limit

$$\lim_{n\to\infty} \frac{1}{3n} \sum_{k=1}^{n} e^{3+\frac{k}{n}}$$

as a definite integral.

A.

$$\frac{1}{3}\int_3^4 e^x\,dx$$

B.

$$\int_0^1 e^{3+x}\,dx$$

C.

$$3\int_3^4 e^x\,dx$$

D.

$$\int_0^1 e^{3x}\,dx$$

Review: Random variables and integration

For which value of k is the function

$$f(x) = ke^x \sin x, \quad 0 \leq x \leq \frac{\pi}{2}$$

a probability density function?

A. 1
B. $(1 + e^{\pi/2})/2$
C. e^{π}
D. $2/(1 + e^{\pi/2})$
E. $2e^{\pi/4}$

Review: Integration (ctd)

Find the value of the integral

$$\int_1^3 \frac{2x}{(x^2-4)^2}\,dx.$$

A. $-8/15$

B. ∞

C. $1/15$

D. $2/15$

E. 0