

Name: _____

1. Find the area bounded by the y -axis, the graph of $y = e^x$ and the graph of $y = xe^x$.

(A) 1 (B) 2 (C) $e - 2$ (D) e (E) $e + 2$ (F) $2e$ (G) $e^2 - e$ (H) $3e - 2$

4. Evaluate

$$\int \frac{dx}{x^2 - 2x - 3}$$

(A) $\frac{1}{\sqrt{3}} \arctan(\sqrt{3}x) + C$

(B) $-\frac{1}{x} - \frac{1}{2} \ln(x) - \frac{x}{3} + C$

(C) $-\frac{1}{8} \left(\frac{1}{x+1} + \frac{1}{x-3} \right) + C$

(D) $\frac{1}{2} \ln|x-1| + C$

(E) $\frac{2}{3} \ln|x-3| + \ln|x-1| + C$

(F) $\frac{1}{3} \ln \left| \frac{x-1}{x-3} \right| + C$

(G) $-\frac{1}{(x-3)^2} + \frac{1}{(x+1)^2} + C$

(H) $\frac{1}{4} \ln \left| \frac{x-3}{x+1} \right| + C$

5. Evaluate the integral: $\int_1^{e^2} \frac{\ln x}{\sqrt{x}} dx$

(A) $e - 1$

(B) $2e$

(C) e

(D) $\frac{4}{3}e$

(E) 4

(F) $4 - 4 \ln 2$

(G) $4 + 4 \ln 2$

(H) $4 \ln 2$

12. A random variable has as probability density function $p(x) = 2(x + 1)^{-3}$ for $x \geq 0$ and $p(x) = 0$ else. What is the mean of the random variable?

- (A) $\sqrt{2}$ (B) $\frac{3}{2}$ (C) 1 (D) $2\sqrt{2}$ (E) 2 (F) 4 (G) 0 (H) $\frac{11}{2}$
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