
Which of the following is the integrating factor?

- A. $e^{\int Q\,dx}$
- B. $e^{-\int Q\,dx}$
- C. $e^{\int P\,dx}$
- D. $e^{-\int P\,dx}$

Solution:
SOLUTION:
The correct answer is C.
Correct Answers:

- C

The motivation for the integrating factor is so that $e^{\int P\,dx}(y'+Py)$ becomes which of the following?

- A. $e^{-\int P\,dx}\int e^{\int P\,dx}y\,dx$
- B. $\frac{d}{dx}\left(e^{\int Q\,dx}y\right)$
- C. $\frac{d}{dx}\left(e^{\int P\,dx}y\right)$
- D. $\frac{d}{dx}\left(e^{-\int P\,dx}y\right)$

Solution:
SOLUTION:
The correct answer is C.
Correct Answers:

- C

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3. (1 point) The differential equation $\frac{dy}{dx}=9y$ is a linear differential equation.
Convert the equation to standard form (use the prime notation for the derivative):
________ = ________
The integrating factor is: ________
After multiplying both sides by the integrating factor and unapplying the product rule we get the new differential equation:
$\frac{d}{dx}$ [________] = ________
Integrating both sides we get algebraic equation ________ $=C$
Solving for y, the solution to the differential equation is y = ________

Correct Answers:

- `y'-9*y`
- `0`
- `e^(-9*x)`
- `e^(-9*x)*y`
- `0`
- `e^(-9*x)*y`
- `C*e^(9*x)`

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4. (1 point) Solve the differential equation by the method of integrating factors.

$$\frac{dy}{dx}+2xy=2x$$

$y=$ ________ Use "C" to represent any constant of integration.

Solution:
SOLUTION
$p(x)=2x,\ q(x)=2x,\ \mu=e^{x^2}$
Multiplying the DE by e^{x^2} gives

$$e^{x^2}\frac{dy}{dx}+2xe^{x^2}y=2xe^{x^2}$$

integrating we get

$$e^{x^2}y=\int 2xe^{x^2}\,dx=e^{x^2}+C$$

finally solving for y gives

$$y=1+Ce^{-x^2}$$

Correct Answers:

- `1+C*e^(-x^2)`