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NPTEL

reviewer3@nptel.iitm.ac.in ▾

Courses » Integral Equations,calculus of variations and its applications

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Unit 6 - Week 5

Course outline

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-12, 23:59 IST.

1) $Using\ the\ method\ of\ successive\ approximations,\ the\ solution\ of\ the\ integral\ equation\ \phi(x)=\frac{x^2}{2}+x-\int_0^x \phi(t)dt,\ \ \phi_0(x)=x\ is$ ***1 point***

- $\phi(x)=x+1$
- $\phi(x)=-x$
- $\phi(x)=x$
- $\phi(x)=x-1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\phi(x)=x$

2) ***1 point***
$Using\ the\ method\ of\ successive\ approximations,\ the\ solution\ of\ the\ integral\ equat$
$\phi(x)=1+\int_0^x (x-t)\phi(t)dt,\ \ \phi_0(x)=1\ is$

- $\phi(x)=\sin x$
- $\phi(x)=\cos x$
- $\phi(x)=\sinh x$
- $\phi(x)=\cosh x$

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$The\ resolvent\ kernel\ of\ the\ Volterra\ integral\ equation$
$u(x,t) = f(x) + \frac{1}{2}\int_0^x e^{(x-t)} u(t)dt,\ is$

- $e^{\frac{(x-t)}{2}}$
- $e^{\frac{-(x-t)}{2}}$
- $e^{\frac{3(x-t)}{2}}$
- $e^{\frac{-3(x-t)}{2}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$e^{\frac{3(x-t)}{2}}$

4) $The\ resolvent\ kernel\ of\ the\ Volterra\ integral\ equation$ **1 point**

$$u(x,t) = e^{x\sin x} - \int_0^x \left(\frac{2+\cos x}{2+\cos t}\right) u(t)dt,\ is$$

- $\left(\frac{2+\cos x}{2+\cos t}\right)e^{x-t}$
- $\left(\frac{2+\cos x}{2+\cos t}\right)e^{t-x}$
- $\left(\frac{2+\cos x}{2+\cos t}\right)e^{2(x-t)}$
- $\left(\frac{2+\cos x}{2+\cos t}\right)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\left(\frac{2+\cos x}{2+\cos t}\right)e^{t-x}$

5) $Consider\ the\ Fredholm\ integral\ equation$ **1 point**

$y(x) = \lambda\int_0^1 (2x-t)y(t)dt,$
$where\ \lambda\ is\ a\ \ constant.\ Then\ the\ resolvent\ kernel\ \Gamma(x,t;\lambda)\ is\ given\ by$

- $\frac{2x-t-\lambda(\frac{2}{3}-x-t+2xt)}{1-\frac{\lambda}{2}+\frac{\lambda^2}{6}}$
- $\frac{2x-t-\lambda(\frac{2}{3}-x-t+2xt)}{1-\frac{\lambda}{2}-\frac{\lambda^2}{6}}$
-

$\frac{2x-t+\lambda(\frac{2}{3}-x-t+2xt)}{1-\frac{\lambda}{2}+\frac{\lambda^2}{6}}$

$None\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{2x-t-\lambda(\frac{2}{3}-x-t+2xt)}{1-\frac{\lambda}{2}+\frac{\lambda^2}{6}}$

6) $Consider\ the\ Fredholm\ integral\ equation$ **1 point**

$y(x) = \lambda \int_{-1}^{1} (x+t+1)y(t)dt,$
$where\ \lambda\ is\ a\ constant.\ Then\ the\ resolvent\ kernel$
$\Gamma(x,t;\lambda)\ is\ given\ by$

$\frac{(x+t+1)-2\lambda(xt+\frac{1}{3})}{1+2\lambda+\frac{4\lambda^2}{3}}$

$\frac{(x+t+1)+2\lambda(xt+\frac{1}{3})}{1-2\lambda+\frac{4\lambda^2}{3}}$

$\frac{(x+t+1)+2\lambda(xt+\frac{1}{3})}{1-2\lambda-\frac{4\lambda^2}{3}}$

$none\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{(x+t+1)+2\lambda(xt+\frac{1}{3})}{1-2\lambda-\frac{4\lambda^2}{3}}$

7) $Consider\ the\ Fredholm\ integral\ equation$ **1 point**

$y(x) = \lambda \int_{a}^{b} u(x)u(t)y(t)dt,\ b > a.$
$If\ u(x)\ is\ a\ non\ zero\ continuous\ function\ on\ [a,b],\ then\ the\ integral$
$equation\ has$

$a\ unique\ solution\ for\ each\ \lambda$

$no\ solution\ for\ all\ \lambda$

$infinitely\ many\ solutions\ for\ some\ value\ of\ \lambda$

$none\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$infinitely\ many\ solutions\ for\ some\ value\ of\ \lambda$

8) **1 point**

Consider the Fredholm integral equation

$y(x) = f(x) + \lambda \int_0^{2\pi} \sin x \cos t y(t) dt.$

Then the integral equation has

- $a\ unique\ solution\ for\ each\ \lambda$
- $no\ solution\ for\ any\ \lambda$
- $infinitely\ many\ solutions\ for\ some\ \lambda$
- $none\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$a\ unique\ solution\ for\ each\ \lambda$

9) *Consider the Fredholm integral equation* ***1 point***

$y(x) = x + \lambda \int_0^1 (4xt - x^2) y(t) dt.$

Then

- $y(x) = 24x - 9x^2\ for\ \lambda = 1$
- $y(x) = 24x - 9x^2\ for\ \lambda = -1$
- $y(x) = 2x\ for\ \lambda = 0$
- $none\ of\ these$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$y(x) = 24x - 9x^2\ for\ \lambda = 1$

10) ***1 point***

Consider the Fredholm integral equation

$y(x) = f(x) + \int_0^1 xe^t y(t) dt$

where $f(x)$ *is a non zero continuous function. Then, the integral equation has*

- $no\ solution\ if\ \int_0^1 f(x) e^x dx = 0$
- $a\ solution\ if\ \int_0^1 f(x) x dx = 0$
- $a\ solution\ if\ \int_0^1 f(x) e^x dx = 0$
- $none\ of\ the\ above$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$a\ solution\ if\ \int_0^1 f(x) e^x dx = 0$

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