

# أسئلة سنوات

فاينل

لجنة سنافر البوليتكنك - بسواعدنا نبنيها

اسم المادة

النفاضل والتكامل 102



تواصل معنا

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الاسم	MATH 102	DATE: MAY, 2011
المدرس	FINAL EXAM	TIME: TWO HOURS

ID: A

MATH2

Lecture time( )

CHOOSE THE CORRECT ANSWER

(50 points)

1. If  $f(x) = \begin{cases} x^2 - 1 & , -2 \leq x < 0 \\ g(x) & , 0 < x \leq 2 \end{cases}$  is an odd function then  $g(x) =$

- a.  $x^2 - 1$       b.  $-x^2 - 1$       c.  $x^2 + 1$       d.  $1 - x^2$

2. If  $f(x) = x^2$ ,  $x \in [-1, 3]$  and  $f(x+4) = f(x) \quad \forall x \in \mathbb{R}$  then  $f(81) =$

- a. 1      b. 0      c. 2      d. 3

3.  $\int_{-\pi}^{\pi} \left( \frac{\cos x}{x^3 + x} \right) dx =$

- a. 1      b. 2      c. 0      d. 4

4. The Fourier coefficients ( $b_n$ ) of the Fourier series corresponding to

$f(x) = \begin{cases} -1 & , -2 < x < 0 \\ 1 & , 0 < x < 2 \end{cases}$ ,  $f(x+4) = f(x) \quad \forall x \in \mathbb{R}$  is:

- a.  $\frac{2}{n\pi} \left[ 1 + (-1)^n \right] \quad n = 1, 2, 3, \dots$       c.  $\frac{2}{n\pi} \left[ 1 - (-1)^n \right] \quad n = 1, 2, 3, \dots$   
b.  $-\frac{2}{n\pi} \left[ 1 + (-1)^n \right] \quad n = 1, 2, 3, \dots$       d.  $\frac{2}{n\pi} \left[ (-1)^n - 1 \right] \quad n = 1, 2, 3, \dots$

5. The Fourier coefficient ( $a_0$ ) of the Fourier cosine series corresponding to  $f(x) = \begin{cases} 1 & , 0 < x < \frac{\pi}{2} \\ 2 & , \frac{\pi}{2} < x < \pi \end{cases}$

is:

- a. 1      b. 2      c. 3      d. 4

Name: \_\_\_\_\_

6.  $\mathcal{L}^{-1}\{\ln(s^2+9)\} =$

a.  $\frac{2\cos 3t}{t}$

b.  $-\frac{2\cos 3t}{t}$

c.  $\frac{\cos 3t}{t}$

d.  $-\frac{\cos 3t}{t}$

7. If  $\mathcal{L}\{y(t)\} = Y(s)$

and  $y''' + 2y'' - y = 0$ ,  $y(0) = y'(0) = 0$ ,  $y''(0) = 1$  then  $Y(s) =$

a.  $\frac{1}{s^3 + 2s^2 - 1}$

b.  $\frac{-1}{s^3 + 2s^2 - 1}$

c.  $\frac{1}{s^3 - 2s^2 + 1}$

d.  $\frac{-1}{s^3 - 2s^2 + 1}$

8.  $\mathcal{L}^{-1}\left\{\frac{1}{s-4}\right\} =$

a.  $e^{-4t}$

b.  $e^{4t}$

c.  $\sinh 2t$

d.  $\cosh 2t$

9.  $\mathcal{L}\{\sinh wt\} =$

a.  $\frac{w}{s^2 - w^2}$

b.  $\frac{s}{s^2 - w^2}$

c.  $\frac{w}{s^2 + w^2}$

d.  $\frac{s}{s^2 + w^2}$

10.  $\mathcal{L}^{-1}\left\{\frac{s}{s^2 - 6s + 10}\right\} =$

a.  $e^{3t}(\cos t - \sin t)$

b.  $e^{-3t}(\cos t + \sin t)$

c.  $e^{-3t}(\cos t - \sin t)$

d.  $e^{3t}(\cos t + \sin t)$

11.  $\mathcal{L}\{te^{2t}\sin t\} =$

a.  $\frac{2(s+2)}{\{(s+2)^2 + 1\}^2}$

b.  $\frac{2(s-2)}{\{(s-2)^2 + 1\}^2}$

c.  $-\frac{2(s+2)}{\{(s+2)^2 + 1\}^2}$

d.  $-\frac{2(s-2)}{\{(s-2)^2 + 1\}^2}$

12.  $\mathcal{L}\left\{\frac{5}{e^t}\right\} =$

a.  $\frac{5}{s-1}$

b.  $\frac{5}{s}$

c.  $\frac{5}{s+1}$

d.  $\frac{1}{s-5}$



13. The general solution of the differential equation  $xy' + y = 4x \ln x$ ,  $x > 0$  is:

a.  $y = 2x \ln x - x + c$

c.  $y = 4x \ln x - 2x + cx^{-1}$

b.  $y = 2x \ln x - x + cx^{-1}$

d.  $y = 4x \ln x - 2x + c$

14. If  $y_1 = x$ ,  $y_2 = e^x$  and  $y_3 = e^{4x}$  then the Wronskian  $W(y_1, y_2, y_3) =$

a.  $(12x - 15)e^{5x}$

b.  $(12x + 15)e^{5x}$

c.  $12x e^{5x}$

d.  $15 e^{5x}$

15. If  $\Omega$  is the region bounded by the trapezoid whose vertices

$(-1, 1)$ ,  $(2, 1)$ ,  $(0, 0)$  and  $(2, 0)$  then  $\iint_{\Omega} 2x dA =$

a.  $\frac{11}{2}$

b.  $\frac{11}{3}$

c.  $\frac{22}{3}$

d. 11

16.  $\int_1^2 \int_1^2 \int_1^5 dz dy dx =$

b. 2

17. If  $f(x, y) = x^3 y^2 + xy + 1$  then  $f_1(x, y) =$

a.  $2x^2 y + x$

b.  $3x^2 y^2 + x$

c.  $2x^3 y + y$

d.  $3x^2 y^2 + y$

18. At the point  $(2, 1, 3)$ , the function  $f(x, y, z) = xy + xz + yz$  is increasing most rapidly in the direction of

a.  $-4\hat{i} - 5\hat{j} - 3\hat{k}$

b.  $\hat{i} + \hat{j} + \hat{k}$

c.  $4\hat{i} + 5\hat{j} + 3\hat{k}$

d.  $4\hat{i} + 5\hat{j} + 3\hat{k}$

19. The directional derivative of  $f(x, y) = x \sec^{-1} y$  at the point  $(0, 2)$  in the direction of the vector  $3\hat{i} + 4\hat{j}$  equals:

a.  $\frac{\pi}{2}$

b.  $\frac{\pi}{3}$

c.  $\frac{\pi}{4}$

d.  $\frac{\pi}{5}$

20. The general solution of the differential equation  $y'' - y' = 2y$  is:

a.  $y = c_1 e^x + c_2 e^{-2x}$

c.  $y = c_1 e^{-x} + c_2 e^{2x}$

b.  $y = c_1 + c_2 e^x + 2x$

d.  $y = c_1 + c_2 e^x - 3x$