NAME_____

SCORE SHEET [20 PROBLEMS]

1		5		9		13		17	
2		6		10		14		18	
3		7		11		15		19	
4		8		12		16		20	

Questions taken from 256 Problem Collection at ilearnmath.net

Problem 1

The third-degree Taylor polynomial about $x = 0$ of $\ln(1 - x)$ is:

SHOW ANSWER

A. $-x - \frac{x^2}{2} - \frac{x^3}{3}$

B. $1 - x + \frac{x^2}{2}$

C. $x - \frac{x^2}{2} + \frac{x^3}{3}$

D. $-1 + x - \frac{x^2}{2}$

E. $-x + \frac{x^2}{2} - \frac{x^3}{3}$

Problem 2

$\int_0^\infty e^{-2t}\,dt$ is

SHOW ANSWER

A. -1

B. -0.5

C. 0.5

D. 1

E. divergent

Problem 3

The area of one loop of the graph of the polar equation $r = 2\sin(3\theta)$is given by which of the following?

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A. $4\int_0^{\frac{\pi}{3}} \sin^2(3\theta)\, d\theta$

B. $2\int_0^{\frac{\pi}{3}} \sin(3\theta)\, d\theta$

C. $2\int_0^{\frac{\pi}{3}} \sin^2(3\theta)\, d\theta$

D. $2\int_0^{\frac{2\pi}{3}} \sin^2(3\theta)\, d\theta$

E. $2\int_0^{\frac{2\pi}{3}} \sin(3\theta)\, d\theta$

Problem 4

$$\lim_{x\to 0}\frac{e^{3x}-1}{\tan x}=$$

SHOW ANSWER

A. -1
B. 0
C. 1
D. 3
E. DNE

Problem 5

Identify the false statement.

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A. $\frac{d\sinh(x)}{dx}=\cosh(x)$
B. $\frac{d\cosh(x)}{dx}=\sinh(x)$
C. $\int_a^t sech^2(x)dx=\tanh(t)-\tanh(a)$
D. $\cosh^2(x)-\sinh^2(x)=1$
E. All four statements are true.

Problem 6

Evaluate $\int_0^6 \sqrt{6x - x^2}dx$

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A. π

B. 2π

C. $\frac{5\pi}{2}$

D. $\frac{9\pi}{2}$

E. 3π

Problem 7

$\int \ln(x)x^4dx =$

SHOW ANSWER

A. $\frac{x^5\ln(x)}{5} + \frac{x^6}{30} + C$

B. $\frac{x^5\ln(x)}{5} + \frac{x^5}{25} + C$

C. $\frac{x^5}{5}\frac{1}{x} + C$

D. $\frac{(\ln(x))^2x^5}{7} + C$

E. $\frac{x^5\ln(x)}{5} - \frac{x^5}{25} + C$

Problem 8

Find $\int e^{mx}\cos(nx)dx$

SHOW ANSWER

A. $e^{mx}\dfrac{m\cos(nx)-n\sin(nx)}{m^2+n^2}+C$

B. $e^{mx}\dfrac{\cos(nx)-\sin(nx)}{m^2+n^2}+C$

C. $e^{mx}\dfrac{n\sin(nx)+m\cos(nx)}{m^2+n^2}+C$

D. $\dfrac{-e^{mx}\cos(nx)}{n}+C$

E. Non of the above.

Problem 9

Find the arclength of the curve $y=\ln(\sin(x))$ on the interval $[\frac{\pi}{4},\frac{\pi}{2}]$.

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A. $\ln(\dfrac{\sqrt{2}}{2}+1)$

B. $\ln(1+\sqrt{2})$

C. $\sqrt{2}$

D. $\ln(1+\sqrt{2})-1$

E. $1-\ln(1+\sqrt{2})$

Problem 10

The area bounded by the lemniscate with polar equation $r^2 = 2\cos(2\theta)$ is equal to

SHOW ANSWER

A. 4
B. 1
C. $\frac{1}{2}$
D. 2
E. None of the above

Problem 11

The graph of the polar equation $r = \frac{1}{\sin\theta - 2\cos\theta}$ is:

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A. a circle
B. a line with slope 1
C. a line with slope 2
D. a parabola
E. a semi-circle

Problem 12

The power series $x + \frac{x^2}{2} + \frac{x^3}{3} + ... + \frac{x^n}{n} + ...$ converges if and only if:

SHOW ANSWER

A. $-1 < x < 1$
B. $-1 \leq x \leq 1$
C. $-1 \leq x < 1$
D. $-1 < x \leq 1$
E. $x = 0$

Problem 13

The power series $(x+1) - \frac{(x+1)^2}{2!} + \frac{(x+1)^3}{3!} - \frac{(x+1)^4}{4!} + ...$diverges:

SHOW ANSWER

A. for no real x values
B. if $-2 < x \leq 0$
C. if $x < -2$ or $x > 0$
D. if $-2 \leq x < 0$
E. if $x \neq -1$

Problem 14

The series $\sum_{n=0}^{\infty} n!(x-3)^n$ converges if and only if

SHOW ANSWER

A. $x = 0$
B. $2 < x < 4$
C. $x = 3$
D. $2 \leq x \leq 4$
E. $x < 2$ or $x > 4$

Problem 15

The interval of convergence of the series obtained through term by term differentiation of the series $(x-2) - \frac{(x-2)^2}{4} + \frac{(x-2)^3}{9} - \frac{(x-2)^4}{16} + \ldots$ is:

SHOW ANSWER

A. $1 \leq x \leq 3$
B. $1 \leq x < 3$
C. $1 < x \leq 3$
D. $0 \leq x \leq 4$
E. None of the above.

Problem 16

The coefficient of x^4 in the Maclaurin series for $f(x) = e^{\frac{-x}{2}}$ is:

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A. $\frac{-1}{24}$

B. $\frac{1}{24}$

C. $\frac{1}{96}$

D. $\frac{-1}{384}$

E. $\frac{1}{384}$

Problem 17

The Maclaurin polynomial of order 3 for $f(x) = \sqrt{1+x}$ is

SHOW ANSWER

A. $1 + \frac{x}{2} - \frac{x^2}{4} + \frac{3x^2}{8}$

B. $1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{16}$

C. $1 - \frac{x}{2} + \frac{x^2}{8} - \frac{x^3}{16}$

D. $1 + \frac{x}{2} - \frac{x^2}{8} + \frac{x^3}{8}$

E. $1 - \frac{x}{2} + \frac{x^2}{4} - \frac{3x^3}{8}$

Problem 18

The Taylor polynomial of order 3 at x=1 for e^x is:

SHOW ANSWER

A. $1 + (x-1) + \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3}$

B. $e[1 + (x-1) + \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3}]$

C. $e[1 + (x+1) + \frac{(x+1)^2!}{2} + \frac{(x-1)^3!}{3!}]$

D. $e[1 + (x-1) + \frac{(x-1)^2}{2!} + \frac{(x-1)^3}{3!}]$

E. $e[1 - (x-1) + \frac{(x-1)^2}{2!} - \frac{(x-1)^3}{3!}]$

Problem 19

The coefficient of $(x - \frac{\pi}{4})^3$ in the Taylor series about $\frac{\pi}{4}$ of $f(x) = \cos x$ is

SHOW ANSWER

A. $\frac{\sqrt{3}}{12}$

B. $\frac{-1}{12}$

C. $\frac{1}{12}$

D. $\frac{1}{6\sqrt{2}}$

E. $\frac{-1}{3\sqrt{2}}$

Problem 20

The radius of convergence of the series $\sum_{n=1}^{\infty} \frac{x^n * n^n}{2^n * n!}$ is:

SHOW ANSWER

A. 0

B. 2

C. $\frac{2}{e}$

D. $\frac{e}{2}$

E. ∞

ANSWER KEY

1 (60)	A	5 (157)	E	9 (190)	B	13 (242)	A	17 (246)	B
2 (70)	C	6 (180)	D	10 (239)	D	14 (243)	C	18 (247)	D
3 (76)	C	7 (181)	E	11 (240)	C	15 (244)	C	19 (248)	D
4 (87)	D	8 (182)	C	12 (241)	C	16 (245)	E	20 (249)	C