1. Find $(f^{-1})'(a)$ for $f(x) = \sqrt{x^3 + 2x^2 + 1}, a = 2$

A) 2　　　　B) 1　　　　C) 1/2　　　　D) 0　　　　E) -1

2. Find $f''(o)$ of $\quad f(x) = x^2 e^x$

A) 0   B) 1   C) 2   D) 3   E) 4

3. Differentiate the function $f(x) = e^{\cos 5x}$

A) $5e^{\cos 5x}\sin 5x$ B) $5e^{\cos 5x}\cos 5x$ C) $5e^{\sin 5x}\cos 5x$ D) $-5e^{\cos 5x}\sin 5x$ E) $-5e^{\cos 5x}\cos 5x$

4. Solve the equation for x

$$e^{x^2+2x} = 1$$

A) $0, 2$ B) $1, 2$ C) ± 1 D) $0, -2$ E) $-1, 2$

$$e^{x^2+2x} = 1$$

5. Find $cos(sin^{-1}(\frac{\sqrt{3}}{2}))$

A) $\frac{\sqrt{3}}{2}$ B) 1   C) $\frac{1}{2}$ D) 0   E) 2

6. Evaluate $\lim\limits_{x \to -\infty} \frac{\sinh x}{e^{-x}}$

A) 1 $\qquad$ B) $\frac{1}{2}$ $\qquad$ C) 0 $\qquad$ D) -1 $\qquad$ E) 0

7. Find the limit $\lim\limits_{x \to 0} \frac{e^x - 1 - x}{x^2}$

A) 1   B) $\frac{1}{2}$ C) ∞ D)   E) 0

8. Evaluate $\int \ln x \, dx$

A) $x \ln x - x + C$ B) $\ln x + C$ C) $\frac{\ln x}{x} + x + C$ D) $\frac{\ln x}{x} - x + C$ E) $x \ln x + x + C$

9. Evaluate $\int xe^x dx$

A) $e^x + C$ B) $xe^x + C$ C) $xe^x - e^x + C$ D) $xe^x + e^x + C$ E) 0

10. Find the value of the integral $I = \int_0^\pi (sinx)^3 dx$

A) 1   B) $\frac{4}{3}$ C) 0   D) 8π E) $\frac{2\pi}{3}$

11. Find the value of the integral $\quad I = \int_0^1 \sqrt{x^2 + 1}\,dx$

A) 1   B) $\ln(\sqrt{2} - 1)$ C) $\ln(\sqrt{2} + 1)$ D) $\ln 2$ E)0

12. Find the value of the integral $I = \int_0^{\frac{1}{2}} \frac{x}{x^2-1} dx$

A) $\frac{1}{2}\ln\left(\frac{3}{4}\right)$ B) $\ln\left(\frac{3}{4}\right)$ C) $\frac{1}{2}\ln\left(\frac{4}{3}\right)$ D) $\frac{1}{2}\ln\left(\frac{2}{3}\right)$ E) $\frac{1}{2}\ln 2$

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13. Solve the differential equation $y' = y$ subject to the initial condition $y(0) = 0$. From your solution find $y(e)$.

A) e^e B) e C) $e^e - 1$ D) 0 E) $e^e - e$

14. Find power series representation for the following function and determine the interval on which it is valid.

$$f(x) = sin(x^2)$$

A) $\sum_{k=0}^{\infty} (-1)^k \frac{x^{4k+2}}{(2k+1)!}$, valid for all x.

B) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k+1)!}$, valid for all x.

C) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{4k+2}}{(2k+1)!}$, valid for all x.

D) $\sum_{k=0}^{\infty} x^k$, valid for $|x| < 1$

E) $x^2 + \frac{x^4}{2} + \frac{x^4}{6} + ...$, valid for $|x| < 2$.

15. A bridge hand consists of 13 cards chosen at random from a deck of 52. You are dealt a hand. What is the probability that it has at least one spade? *Hint: 39 of the cards in the deck are NOT spades.*

A) $1 - \binom{39}{13}/\binom{52}{13}$ B) $\binom{39}{13}/\binom{52}{13}$ C) $\binom{39}{13}$ D) $\binom{52}{13}$ E) $\binom{13}{13}$

16. Find the taylor polynomial of degree 4 for the function $f(x) = \frac{1}{1-x}$.

A) $1 - x + x^2 - x^3 + x^4$ B) $1 + x + x^2 + x^3 + x^4$ C) $1 + x + x^2 + x^3$

D) $1 + \frac{x}{2} + \frac{x^3}{3} + \frac{x^4}{4}$ E) $\sin x$

17. Suppose an initial amount of $500 is invested at an annual rate of 6.5% compounded continuously. How much will there be at the end of two years?

A) $500(1 + \frac{0.065}{12})^{(20)12}$ B) $500e^{(20)65}$ C) $500e^{(20)0.065}$ D) 501   E) 1000

18. Calculate $\binom{15}{2}$.

A) 30   B) 96   C) 210   D) -7   E) 105

19. Use the linear approximation and estimate the size of the error. $f(x) = \sin x$ where $x = 0.02$

A) $1.02, |error| \le \frac{(0.02)^2}{2}$ B) $0.02, |error| \le \frac{(0.02)^2}{2}$ C) $-0.02, |error| \le \frac{(0.02)^2}{2}$

D) $0.02, |error| \le \frac{(0.02)^3}{2000}$ E) None of the above.

20. Find the power series representation of the following function and determine the interval on which it is valid: $t(x) = xe^x$.

A) $\displaystyle\sum_{k=0}^{\infty} \frac{x^{k+1}}{k!}$, valid for all x

B) $\displaystyle\sum_{k=0}^{\infty} \frac{x^k}{k!}$, valid for all x.

C) $x + x^2 + \frac{x^3}{2!}$, valid for all x.

D) $\displaystyle\sum_{k=0}^{\infty} \frac{(-1)^k x^{k+1}}{k!}$, valid for all x.

E) None of the above.