

Math 182 Honors Very Long Quiz 7 Version A

1. Find the following indefinite integrals:

(i) $\int \frac{1}{x^2 - x - 2} dx$

(ii) $\int x^2 e^{-x} dx$

(iii) $\int \arctan \sqrt{x} dx$

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2. Find the following definite integrals:

(i) $\int_0^1 x^2 dx$

(ii) $\int_0^{\pi/6} \cos(2x) dx$

(iii) $\int_1^{e^2} \ln x dx$

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3. State Taylor's Theorem with the integral form of the remainder term.

4. State Taylor's formula with remainder term expanded about $a = 0$ for the functions

(i) e^x

(ii) $\ln(1 + x)$

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5. Use Taylor's series to compute

(i) $\lim_{x \rightarrow 0} \frac{e^{x^2} - \cos x}{x^2}$.

(ii) $\lim_{x \rightarrow 0} \frac{\log(1 + x^2) - x^2 \cos x}{x^6}$.

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6. Use the error term in Taylor's Theorem to determine a value for m such that

$$\sum_{k=0}^m \frac{(-1)^k \left(\frac{1}{3}\right)^{2k+1}}{(2k+1)!}$$

approximates $\sin \frac{1}{3}$ to within 10^{-13} . To minimize needless computation you may use the table at the bottom of the page.

n	3^n	$n!$
1	3	1
2	9	2
3	27	6
4	81	24
5	243	120
6	729	720
7	2,187	5,040
8	6,561	40,320
9	19,683	362,880
10	59,049	3,628,800
11	177,147	39,916,800
12	531,441	479,001,600
13	1,594,323	6,227,020,800
14	4,782,969	87,178,291,200

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7. Use the integral test to determine whether the following infinite series converge.

(i) $\sum_{n=1}^{\infty} \frac{1}{n}$

(ii) $\sum_{n=1}^{\infty} \frac{1}{n^3}$

(iii) $\sum_{n=1}^{\infty} \frac{e^{-\sqrt{n}}}{\sqrt{n}}$