

Math 182 Honors Quiz 11 Version A

1. Find the following limits and integrals:

$$(i) \lim_{x \rightarrow 1} \frac{x^3 + 2x^2 - 3}{\ln x}$$

$$(ii) \lim_{x \rightarrow 0} \frac{e^x - 1}{\sin 3x}$$

$$(iii) \int \frac{e^{1/x} dx}{x^2}$$

$$(iv) \int \frac{dx}{(x+1)(x+2)(x+3)}$$

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2. Find $\frac{d^2}{dx^2} |\sin x|^7$

3. Recall that

$$\sum_{n=1}^{\infty} \frac{1}{n^p} = \begin{cases} \text{finite} & \text{for } p > 1 \\ \infty & \text{for } p \leq 1 \end{cases} \quad \text{and} \quad \sum_{n=1}^{\infty} \frac{1}{\alpha^n} = \begin{cases} \text{finite} & \text{for } |\alpha| > 1 \\ \infty & \text{for } 0 < |\alpha| \leq 1. \end{cases}$$

Explain which of the following sums are finite or infinite:

(i) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n(n+2)}}$

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