



(b) Determine whether the following integral converges or diverges:  $\int_1^{\infty} \frac{1}{x(\ln x)^2} dx$ .

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2. 6 points Determine whether the following series converges or diverges:

(a)  $\sum_{k=2}^{\infty} \frac{(k!)^2 2^k}{(2k)!}$

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$$(b) \sum_{k=1}^{\infty} \frac{2k^2 + 1}{\sqrt{k^5 + k^2}}$$

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$$(c) \sum_{k=3}^{\infty} \frac{k(-1)^k}{k^2 + 1}$$

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3. 9 points

(a) Show that the following series converges, and find the sum of the series:

$$\sum_{k=1}^{\infty} \left( \frac{3}{4^k} - \frac{2}{5^{k-1}} \right)$$

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(b) Using the integral test to determine whether the series converges or diverges:

$$\sum_{k=1}^{\infty} k e^{-k^2}$$

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