10 $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$

$\int \frac{dx}{x(\ln x)^2}$

$u = \ln x$

$du = \frac{1}{x}\,dx$

$\int \frac{du}{u^2}$

$\int u^{-2}\,du$

$\int_{\ln 2}^{\infty} \frac{1}{u^2}\,du$

$\int$ converges so

$\sum$ series

13 $\displaystyle\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$ $\displaystyle\int x^{-2} \ln x \, dx$

$u = \ln x \quad dv = x^{-2}\, dx$

$du = \frac{1}{x}\, dx \quad v = -\frac{1}{x}$

$= -\frac{1}{x} \ln x - \int -\frac{1}{x} \cdot \frac{1}{x}\, dx$

$-\frac{\ln x}{x} + \int x^{-2}\, dx \quad \ln \frac{\frac{1}{n}}{1}$

$\lim_{n \to \infty} -\frac{\ln x}{x} - \frac{1}{x} \Big|_1^n \quad -\frac{\ln n}{n} - \frac{1}{n} - \left(\frac{\ln 1}{1} - \frac{1}{1}\right)$

$\sum$ converges by Integral Test

9 $\sum_{n=1}^{\infty} n e^{-n^2}$ $\int_{1}^{\infty} x e^{-x^2} dx$

$u = -x^2$

$du = -2x\, dx$

$-\frac{1}{2} du = x\, dx$

$-\frac{1}{2} \int_{-1}^{-\infty} e^u\, du$

$\frac{1}{2} \int_{-\infty}^{-1} e^u\, du$

$\lim_{R \to -\infty} \frac{1}{2} e^u \Big|_{R}^{-1}$

$= \frac{1}{2} e^{-1} - \frac{1}{2} e^{R}$

Converges

$\sum$ Converges

$$g'(x) = f'(x^2-1)(2x)$$

$$g'(2) = f'(3)(4)$$

$$f'(3) = \frac{1^3(5)}{16} = \frac{5}{16}(4) = \frac{20}{16} = \frac{5}{4}$$

B

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$$\int_1^7 \sqrt{1+f'(x)^2}\,dx$$

$$2\left(\sqrt{1+2^2}+\sqrt{1+1^2}+\sqrt{1+0^2}+\right)$$

$$2\left(\sqrt{5}+\sqrt{2}+1\right)$$

D