MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 3.4 **Math 1001 Worksheet** WINTER 2025

For practice only. Not to be submitted.

1. Determine whether each of the following improper integrals converges or diverges, finding the value of those integrals that converge.

   (a) $\displaystyle\int_2^\infty \frac{1}{\sqrt{4x+1}}\,dx$

   (b) $\displaystyle\int_0^4 \frac{1}{\sqrt{4-x}}\,dx$

   (c) $\displaystyle\int_{-\infty}^0 e^{3x}\,dx$

   (d) $\displaystyle\int_1^\infty \frac{1}{(x+3)^{\frac{3}{2}}}\,dx$

   (e) $\displaystyle\int_0^\infty \frac{x}{x^4+1}\,dx$

   (f) $\displaystyle\int_{-\infty}^0 \frac{e^x}{1+e^x}\,dx$

   (g) $\displaystyle\int_0^3 \frac{1}{\sqrt{9-x^2}}\,dx$

   (h) $\displaystyle\int_0^3 \frac{x}{\sqrt{9-x^2}}\,dx$

   (i) $\displaystyle\int_e^\infty \frac{1}{x\ln^2(x)}\,dx$

   (j) $\displaystyle\int_{-\infty}^{\frac{3}{2}} \frac{1}{4x^2+9}\,dx$

   (k) $\displaystyle\int_0^\infty xe^{-x}\,dx$

   (ℓ) $\displaystyle\int_1^\infty \frac{\ln(x)}{x\sqrt{x}}\,dx$