MTH 264, Quiz #6, Fall 2022 Name KEY

Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. Determine if the integral converges. If it does, state the value. If it does not, show work to explain why not.

$\int_0^\infty xe^{-x^2}dx$

$u = -x^2$

$du = -2x\,dx$

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

$\int -\frac{1}{2}e^u du =$

$-\frac{1}{2}e^u \to -\frac{1}{2}e^{-x^2}\Big|_0^\infty$

$\lim_{b\to\infty} -\frac{1}{2}e^{-b} + \frac{1}{2}e^0 = \frac{1}{2}$ Converges

2. For the following integrals, state which method you would use, and which basic integration rule. Do not actually perform the integration. Methods may include: substitution, change of variables, complete the square, add/subtract, trig identities, long division, partial fractions, by parts, trig substitution, etc. Basic integration rules may include: power rule, log rule, exponential rule, trig functions, inverse trig functions, etc. Some problems may require more than more method or rule.

a. $\int \frac{x^2}{4x^2+9}dx$ METHOD: long division RULE: arctan + power rule

b. $\int \frac{1}{x^2+6x-7}dx$ METHOD: factor, partial fractions RULE: log rule

c. $\int \frac{x}{x^4+2x^2+2}dx$ METHOD: complete the square, substitution, arctan RULE:

d. $\int \frac{x}{\sqrt{x-2}}dx$ METHOD: change of variables or integration by parts RULE: power rule