# MATH 162 Solutions: QUIZ IV Friday The13th

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|  | *Answer any five of the following six questions. You may answer all six to obtain extra credit.*

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|  ***1. Explain*** *why the following improper integral diverges:* *Solution:* MC900304955[1]*First note that x > ln x for all x ≥ e. Hence:* *and so:**Recalling that* *diverges by the p-test, we now invoke the Comparison Test to obtain the desired result.****2.*** Compute the value of the following convergent improper integral. Assume that *b* is a positive constant. *Solution:**Using the definition of improper integral, we find:* |

*The last limit uses the fact that b > 0.*

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|  | ***3***. Evaluate (i.e. find the exact value) the following convergent improper integral. Show your work! Calculator solutions are not acceptable.*Solution:**Using the definition of improper integral:****4.*** Evaluate (i.e. find the exact value) the following convergent improper integral. Show your work! Calculator solutions are not acceptable.*Solution:**Using the definition of improper integral:****5.*** Determine convergence or divergence. *Justify your answer! (That is, if you use the comparison test, exhibit the function that you choose to use for comparison and show why the appropriate inequality holds.)* Calculator solutions are not acceptable.*Solution:**To apply the comparison test, observe that, for all x ≥ 13:**Applying the p-test, the improper integral**converges, and hence, invoking the Comparison Test, the original improper integral must converge.***6.** Determine convergence or divergence. *Justify your answer! (That is, if you use the comparison test, exhibit the function that you choose to use for comparison and show why the appropriate inequality holds.)* Calculator solutions are not acceptable.*Solution:**To apply the comparison test, observe that, for all x ≥ 13:**Since, the improper integral* *clearly diverges, the original improper integral must diverge as well.****Extra Extra Credit:*** *(Hint: Try using the Comparison Test.)**Solution:*MC900141503[1]*Since x2 > x4 for 0 ≤ x < 1, 1– x2 < 1 – x4, and thus* *for 0 ≤ x < 1.**Now .**Thus, invoking the Comparison Test, the original integral converges also.* |
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