| Name: | Last Name, First Name |
|---|---|
| Student number: | |

| Problem | 1 | 2 | 3 | 4 | 5 | 6 | | Total |
|---|---|---|---|---|---|---|---|---|
| Maximum | 10 | 10 | 11 | 10 | 10 | 24 | | 75 |
| Points received | | | | | | | | |

# MATH 155 — FINAL EXAM

April 10 , 2000

**Please read these instructions carefully.**

Please make sure you have received 9 (nine) pages including this cover page with **6 (six)** problems. You have **two hours** for the exam, and you may attempt the problems in any order. You may use a **handwritten** three-page summary of your notes during this exam. You are also allowed to make use of a non-programmable electronic calculator. No other help is allowed.

Write your name (last name, first name) and your student number on the first page of this booklet where indicated.

To receive credit you **must show your work for all problems**.

**Please write your answers and show your work in this question booklet!**

*Good Luck!*

| | | | |
|---|---|---|---|
| $\sin^2 x + \cos^2 x = 1$ | $\tan^2 x + 1 = \sec^2 x$ | $\cos^2 x = \frac{1}{2}(1 + \cos(2x))$ | $\frac{d}{dx} \sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$ |
| $\frac{d}{dx} \sin x = \cos x$ | $\frac{d}{dx} \cos x = -\sin x$ | $\frac{d}{dx} \tan x = \sec^2 x = \frac{1}{\cos^2 x}$ | $\frac{d}{dx} \tan^{-1}(x) = \frac{1}{1+x^2}$ |
| $\frac{d}{dx} e^{\alpha x} = \alpha e^{\alpha x}$ | $\frac{d}{dx} x^{\alpha} = \alpha x^{\alpha-1}$ | $\frac{d}{dx} \ln \lvert x \rvert = \frac{1}{x}$ | $\frac{d}{dx} \ln \lvert f(x) \rvert = \frac{f'(x)}{f(x)}$ |

**Normal distribution** The density function $g$ of a *standard normal random variable* is given by $g(s) = \frac{1}{\sqrt{2\pi}} e^{-s^2/2}$. The normal curve area $A(z) = \int_0^z g(s)ds$ is tabulated below (for values $z > 4$ we list $0.5 - A(z)$):

| $z$ | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
|---|---|---|---|---|---|---|---|---|---|---|
| .0 | .00000 | .00399 | .00798 | .01197 | .01595 | .01994 | .02392 | .02790 | .03188 | .03586 |
| .1 | .03983 | .04380 | .04776 | .05172 | .05567 | .05962 | .06356 | .06749 | .07142 | .07535 |
| .2 | .07926 | .08317 | .08706 | .09095 | .09483 | .09871 | .10257 | .10642 | .11026 | .11409 |
| .3 | .11791 | .12172 | .12552 | .12930 | .13307 | .13683 | .14058 | .14431 | .14803 | .15173 |
| .4 | .15542 | .15910 | .16276 | .16640 | .17003 | .17364 | .17724 | .18082 | .18439 | .18793 |
| .5 | .19146 | .19497 | .19847 | .20194 | .20540 | .20884 | .21226 | .21566 | .21904 | .22240 |
| .6 | .22575 | .22907 | .23237 | .23565 | .23891 | .24215 | .24537 | .24857 | .25175 | .25490 |
| .7 | .25804 | .26115 | .26424 | .26730 | .27035 | .27337 | .27637 | .27935 | .28230 | .28524 |
| .8 | .28814 | .29103 | .29389 | .29673 | .29955 | .30234 | .30511 | .30785 | .31057 | .31327 |
| .9 | .31594 | .31859 | .32121 | .32381 | .32639 | .32894 | .33147 | .33398 | .33646 | .33891 |
| 1.0 | .34134 | .34375 | .34614 | .34849 | .35083 | .35314 | .35543 | .35769 | .35993 | .36214 |
| 1.1 | .36433 | .36650 | .36864 | .37076 | .37286 | .37493 | .37698 | .37900 | .38100 | .38298 |
| 1.2 | .38493 | .38686 | .38877 | .39065 | .39251 | .39435 | .39617 | .39796 | .39973 | .40147 |
| 1.3 | .40320 | .40490 | .40658 | .40824 | .40988 | .41149 | .41309 | .41466 | .41621 | .41774 |
| 1.4 | .41924 | .42073 | .42220 | .42364 | .42507 | .42647 | .42785 | .42922 | .43056 | .43189 |
| 1.5 | .43319 | .43448 | .43574 | .43699 | .43822 | .43943 | .44062 | .44179 | .44295 | .44408 |
| 1.6 | .44520 | .44630 | .44738 | .44845 | .44950 | .45053 | .45154 | .45254 | .45352 | .45449 |
| 1.7 | .45543 | .45637 | .45728 | .45818 | .45907 | .45994 | .46080 | .46164 | .46246 | .46327 |
| 1.8 | .46407 | .46485 | .46562 | .46638 | .46712 | .46784 | .46856 | .46926 | .46995 | .47062 |
| 1.9 | .47128 | .47193 | .47257 | .47320 | .47381 | .47441 | .47500 | .47558 | .47615 | .47670 |
| 2.0 | .47725 | .47778 | .47831 | .47882 | .47932 | .47982 | .48030 | .48077 | .48124 | .48169 |
| 2.1 | .48214 | .48257 | .48300 | .48341 | .48382 | .48422 | .48461 | .48500 | .48537 | .48574 |
| 2.2 | .48610 | .48645 | .48679 | .48713 | .48745 | .48778 | .48809 | .48840 | .48870 | .48899 |
| 2.3 | .48928 | .48956 | .48983 | .49010 | .49036 | .49061 | .49086 | .49111 | .49134 | .49158 |
| 2.4 | .49180 | .49202 | .49224 | .49245 | .49266 | .49286 | .49305 | .49324 | .49343 | .49361 |
| 2.5 | .49379 | .49396 | .49413 | .49430 | .49446 | .49461 | .49477 | .49492 | .49506 | .49520 |
| 2.6 | .49534 | .49547 | .49560 | .49573 | .49585 | .49598 | .49609 | .49621 | .49632 | .49643 |
| 2.7 | .49653 | .49664 | .49674 | .49683 | .49693 | .49702 | .49711 | .49720 | .49728 | .49736 |
| 2.8 | .49744 | .49752 | .49760 | .49767 | .49774 | .49781 | .49788 | .49795 | .49801 | .49807 |
| 2.9 | .49813 | .49819 | .49825 | .49831 | .49836 | .49841 | .49846 | .49851 | .49856 | .49861 |
| 3.0 | .49865 | .49869 | .49874 | .49878 | .49882 | .49886 | .49889 | .49893 | .49896 | .49900 |
| 3.1 | .49903 | .49906 | .49910 | .49913 | .49916 | .49918 | .49921 | .49924 | .49926 | .49929 |
| 3.2 | .49931 | .49934 | .49936 | .49938 | .49940 | .49942 | .49944 | .49946 | .49948 | .49950 |
| 3.3 | .49952 | .49953 | .49955 | .49957 | .49958 | .49960 | .49961 | .49962 | .49964 | .49965 |
| 3.4 | .49966 | .49968 | .49969 | .49970 | .49971 | .49972 | .49973 | .49974 | .49975 | .49976 |
| 3.5 | .49977 | .49978 | .49978 | .49979 | .49980 | .49981 | .49981 | .49982 | .49983 | .49983 |
| 3.6 | .49984 | .49985 | .49985 | .49986 | .49986 | .49987 | .49987 | .49988 | .49988 | .49989 |
| 3.7 | .49989 | .49990 | .49990 | .49990 | .49991 | .49991 | .49992 | .49992 | .49992 | .49992 |
| 3.8 | .49993 | .49993 | .49993 | .49994 | .49994 | .49994 | .49994 | .49995 | .49995 | .49995 |
| 3.9 | .49995 | .49995 | .49996 | .49996 | .49996 | .49996 | .49996 | .49996 | .49997 | .49997 |
| 4.0 | .49997 | .49997 | .49997 | .49997 | .49997 | .49997 | .49998 | .49998 | .49998 | .49998 |

| $0.5 - A(z)$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $z$ | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
| 4.0 | 3.2e-005 | 2.1e-005 | 1.3e-005 | 8.5e-006 | 5.4e-006 | 3.4e-006 | 2.1e-006 | 1.3e-006 | 7.9e-007 | 4.8e-007 |
| 5.0 | 2.9e-007 | 1.7e-007 | 1.0e-007 | 5.8e-008 | 3.3e-008 | 1.9e-008 | 1.1e-008 | 6.0e-009 | 3.3e-009 | 1.8e-009 |
| 6.0 | 9.9e-010 | 5.3e-010 | 2.8e-010 | 1.5e-010 | 7.8e-011 | 4.0e-011 | 2.1e-011 | 1.0e-011 | 5.2e-012 | 2.6e-012 |