MAT1505-02/03 23F Test 2 Print Name (Last, First) _____ , _____|____

Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, IDENTIFYING expressions by their proper symbols (introducing them if necessary), and use EQUAL SIGNS and arrows when appropriate. Always SIMPLIFY expressions. BOX final short answers. LABEL parts of each problem. Keep answers EXACT (but give decimal approximations for interpretation when appropriate). Indicate where technology is used and what type (Maple, GC). Only use technology to CHECK hand calculations, not substitute for them.

pledge

When you have completed the exam, please read and sign the dr bob integrity pledge and hand this test sheet in on top of your answer sheets as a cover page, with the first test page facing up:
"During this examination, all work has been my own. I give my word that I have not resorted to any ethically questionable means of improving my grade or anyone else's on this examination and that I have not discussed this exam with anyone other than my instructor, nor will I until after the exam period is terminated for all participants."

Signature: Date:

1. a) State the limit needed to evaluate the improper integral: $\int_2^4 \frac{x}{\sqrt{x-2}}\,dx$.

b) Evaluate the indefinite integral $\int \frac{x}{\sqrt{x-2}}\,dx$ by variable substitution.

c) Use the antiderivative you found to evaluate the limit of part a).

d) Does it agree with the direct evaluation of a) using technology?

2. a) Find the length of the very special curve $y = \frac{(x^2+2)^{\frac{3}{2}}}{3}$ on the interval $0 \le x \le 3$ by simplifying the arclength integrand radical of a perfect square ($a^2 + 2\,a\,b + b^2 = (a+b)^2$; the Maple context command "factor" applied to this expression will work if you have trouble with the algebra).

b) Compare your result to the length of the secant line between the endpoints of the graph of this function on this interval. Support your calculation with a rough diagram of the secant line and the curve.

3. a) Show that $f(x) = 3\,x^2\,e^{-x^3}$ is a probability function on the interval $x \ge 0$ by evaluating the improper integral $\int_0^\infty 3\,x^2\,e^{-x^3}\,dx$ stating explicitly the required limit needed to evaluate it.

b) Find the exact location $x = X$ of the peak value of the function $f(x)$ and evaluate the exact probability that the variable x takes a value in the interval $[0, X]$ and then convert its numerical value to a percentage to the nearest tenth of a percent.

c) **Optional.** Only consider this if you are confident about your work above this point.
Evaluate the exact median of this distribution (which divides the probability area equally before and after) and its 3 decimal place value. Is it smaller or larger than X?

[do not work or answers on either side of this sheet please]