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# Prof. Dr. Serkan Dağ
# ME 310 Numerical Methods
# File 10.2
# Trapezoidal rule
restart :
Digits := 16 :
unprotect(sum) :
# Define the function to be integrated
f := x^2·exp(x);
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$$f := x^2\, e^x \tag{1}$$

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# Integration limits
x0 := 0. :
xn := 3. :
# Number of integration segments
n := 128. :
h := (xn − x0)/n :
xi := x0 :
sum := 0 :
# Evaluate the integral
for i from 1 by 1 to n − 1
while true do
 xi := xi + h :
 sum := sum + subs(x = xi, f) :
 end do:
res := h/2 · (subs(x = x0, f) + 2·sum + subs(x = xn, f) );
```

$$res := 96.32307951200630 + 0.1054687500000000\, e^{3.} \tag{2}$$

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evalf(res);
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$$98.44147598437375 \tag{3}$$