

P42515-11 odd

⑤  $\int_0^1 e^{-x^2} dx, n=10$

②  $\Delta x = 1/10$  or  $0.1$

$A = \frac{\Delta x}{2} [f(0) + 2f(0.1) + 2f(0.2) + \dots + 2f(0.9) + f(1)]$

$f(0) = 1 \quad \times 1 = 1$

$2f(0.1) = 0.99004983 \times 2 = 1.98009966$

$2f(0.2) = 0.96078944 \times 2 = 1.92157888$

$2f(0.3) = 0.91393119 \times 2 = 1.82786238$

$2f(0.4) = 0.85214379 \times 2 = 1.70428758$

$2f(0.5) = 0.77880078 \times 2 = 1.55760156$

$2f(0.6) = 0.69767633 \times 2 = 1.39535266$

$2f(0.7) = 0.61202639 \times 2 = 1.22405278$

$2f(0.8) = 0.52729242 \times 2 = 1.05458484$

$2f(0.9) = 0.44485807 \times 2 = 0.88971614$

$f(1) = 0.36787944 \times 1 = \underline{0.36787944}$   
14.92421412

$A = \frac{0.1}{2} (14.92421412)$

$A = 0.746210706$

$A \approx 0.746211 \approx \underline{0.746}$

⑥ midpoint rule:  $X_1 = 0.05, X_2 = 0.15, X_3 = 0.25 \dots X_{10} = 0.95$

$A = \Delta x [f(x_1) + f(x_2) + f(x_3) + \dots + f(x_{10})]$

$A = 0.1 [f(0.05) + f(0.15) + f(0.25) + f(0.35) + \dots + f(0.85) + f(0.95)]$

$A = 0.1 (0.99750312 + 0.97775124 + 0.9394136 + 0.8847059 + 0.81668648 + 0.73896849 + 0.65540625 + 0.56978282 + 0.4855369 + 0.4055451)$

$A = 0.1 (7.47130877)$

$A = 0.747130877$

$A \approx 0.747131$

0.747

0.1 rectangle  
 midpoint  
 $\frac{0.1}{2} = 0.05$   
 .05  
 .05+.1 = .15  
 .15+.1 = .25  
 .25+.1 = .35  
 .35+.1 = .45  
 .45+.1 = .55  
 .55+.1 = .65  
 .65+.1 = .75  
 etc

P425/5-11 odd

7)  $\int_0^{1/2} \cos(e^x) dx, n=8$

Trapezoidal Rule

a)  $\Delta x = \frac{1/2}{8} = 0.0625$

$x_1 = 0$	$x_4 = 0.1875$	$x_7 = 0.325$
$x_2 = 0.0625$	$x_5 = 0.25$	$x_8 = 0.4375$
$x_3 = 0.125$	$x_6 = 0.3125$	$x_9 = 0.5$

$A = \Delta x [f(x_1) + 2f(x_2) + 2f(x_3) + 2f(x_4) + 2f(x_5) + 2f(x_6) + 2f(x_7) + 2f(x_8) + f(x_9)]$

$A = 0.0625 [ \cos(e^0) + 2\cos(e^{0.0625}) + 2\cos(e^{0.125}) + 2\cos(e^{0.1875}) + 2\cos(e^{0.25}) + 2\cos(e^{0.3125}) + 2\cos(e^{0.375}) + 2\cos(e^{0.4375}) + \cos(e^{0.5}) ]$

$A = 0.1324651783$

$A \approx 0.132465$   
 (.132)

b) midpoint rule

$\Delta x = 0.0625$

$\frac{0.0625}{2} = 0.03125$

$x_1 = 0.03125$	$x_4 = 0.21875$	$x_7 = 0.40625$
$x_2 = 0.09375$	$x_5 = 0.28125$	$x_8 = 0.46875$
$x_3 = 0.15625$	$x_6 = 0.34375$	

$A = \Delta x [f(x_1) + f(x_2) + \dots + f(x_8)]$

$A = 0.0625 [ \cos(e^{0.03125}) + \cos(e^{0.09375}) + \dots + \cos(e^{0.46875}) ]$

$A = 0.1328571021$

$A \approx 0.132857$

(.133)

0.03125 + 0.0625  
 0.09375 + 0.0625

P425 / 5-11 odd

9)  $\int_0^1 x^5 e^x dx, n=10$

a) trapezoidal rule

$\Delta x = 1/10$  or  $0.1$

$x_1 = 0$	$x_4 = 0.3$	$x_7 = 0.6$	$x_{10} = 0.9$
$x_2 = 0.1$	$x_5 = 0.4$	$x_8 = 0.7$	$x_{11} = 1$
$x_3 = 0.2$	$x_6 = 0.5$	$x_9 = 0.8$	

$$A = \frac{\Delta x}{2} [f(x_1) + 2f(x_2) + 2f(x_3) + 2f(x_4) + \dots + 2f(x_{10}) + f(x_{11})]$$

$$A = \frac{0.1}{2} [0^5 e^0 + 2(1)^5 e^{0.1} + 2(2)^5 e^{0.2} + \dots + 2(9)^5 e^{0.9} + (1)^5 e^1]$$

$A = 0.4091397464$

$A \approx 0.409140$

0.409

b) midpoint rule

$\Delta x = 1/10$  or  $0.1$

$x_1 = 0.05$	$x_4 = 0.35$	$x_7 = 0.65$	$x_{10} = 0.95$
$x_2 = 0.15$	$x_5 = 0.45$	$x_8 = 0.75$	
$x_3 = 0.25$	$x_6 = 0.55$	$x_9 = 0.85$	

$$A = \Delta x [f(x_1) + f(x_2) + \dots + f(x_4) + f(x_{10})]$$

$$A = (0.1) [(0.05)^5 e^{0.05} + (0.15)^5 e^{0.15} + \dots + (0.95)^5 e^{0.95}]$$

$A = 0.3888486398$

$A \approx 0.388849$

.389

p425/5-11 odd

(11)  $\int_0^3 \frac{1}{1+x^4} dx, n=6$   
 $\int_0^3 (1+x^4)^{-1}, n=6$

a) trapezoidal rule

$\Delta x = 3/6 = 1/2$  or 0.5

$x_1 = 0$                        $x_4 = 1.5$                        $x_7 = 3$

$x_2 = 0.5$                        $x_5 = 2$

$x_3 = 1$                        $x_6 = 2.5$

$A = \frac{\Delta x}{2} [f(x_1) + 2f(x_2) + 2f(x_3) + \dots + 2(f(x_6) + f(x_7))]$

$A = \frac{0.5}{2} [(1+0^4)^{-1} + 2(1+0.5^4)^{-1} + \dots + 2(1+2.5^4)^{-1} + (1+3^4)^{-1}]$

$A = 1.098003507$

$A \approx 1.098004 \approx 1.099$

b) midpoint rule

$\Delta x = 0.5$

$x_1 = 0.25$

$x_4 = 1.75$

$x_2 = 0.75$

$x_5 = 2.25$

$x_3 = 1.25$

$x_6 = 2.75$

$A = \Delta x [f(x_1) + f(x_2) + \dots + f(x_6)]$

$A = 0.5 [(1+.25^4)^{-1} + (1+.75^4)^{-1} + \dots + (1+2.75^4)^{-1}]$

$A = 1.098709432$

$A \approx 1.098709$

$1.099$