Matematiska institutionen
CTH/GU

Svar till gamla tentor, Matematiska metoder E1, del B

Tentamen 96-12-20

1. $\frac{\pi}{3}\ln 3$
2. $C_1e^{-x}+C_2\cos 2x+C_3\sin 2x$
   $+\frac{1}{2}(x-1)+\frac{1}{2}(\cos x+\sin x)$
3. a) $1+j$, $-1-3j$, $-2-j$
   b) $e^{\frac{\pi}{4}+2n\pi}(\cos\frac{\ln 2}{2}+\sin\frac{\ln 2}{2}$
   $+j(\cos\frac{\ln 2}{2}-\sin\frac{\ln 2}{2}))$
4. $\frac{1}{x^2}\ln\frac{(x+1)(x+3)^5}{(x+2)^5}+\frac{C}{x^2}$
5. $(x^2+y^2)e^{\arctan\frac{y}{x}}=x^3$
6. b) $F(x)=\begin{cases}\frac{1}{2}e^{2x}, & x\le 0,\\ 1-\frac{1}{2}e^{-2x}, & x\ge 0,\end{cases}$
   $\mu=0$, $\mathrm{Var}[X]=\frac{1}{2}$

Tentamen 97-04-03

1. $\frac{4}{9}(4\sqrt{2}-5)$
2. $2(\sin x-\ln(1+\sin x)+1$ resp $x+\frac{1}{1+\tan x}$
3. $(z^2+3)(z^2+3z+3)(z^2-3z+3)$
4. $e^{-x}(A\cos x+(b+x)\sin x)$
5. $y=1$, $y=\cos x^2$
6. $a=\frac{12\sqrt{3}}{\pi}$

Tentamen 97-08-29

1. a) $\frac{\pi}{4}-2k\pi-\frac{j}{2}\ln 2$ b) $\pm(\sqrt{6}\pm\sqrt{2}j)$
2. $\frac{x\sin x+\cos x}{\cosh x}$
3. $(C+\frac{1}{16}x^2-\frac{1}{8}x)e^x+(A+Bx+\frac{1}{24}x^3+\frac{1}{16}x^2)e^{-x}$
4. $\frac{1}{2}(\frac{\pi}{2}\cosh\frac{2\pi}{3}+\frac{2\pi}{3}+1-\sqrt{3}+\sinh\frac{\pi}{6}-\sinh\frac{2\pi}{3}$
   $+\frac{1}{4}\ln\frac{7-4\sqrt{3}}{3})$
5. $\mathrm{E}[X]=\frac{4-\sqrt{e}}{2}$
6. $x_{k+1}=\frac{x_k\sin x_k+\cos x_k}{1+\sin x_k}$

Tentamen 97-12-19

1. $y=C_1e^{2x}+C_2e^{-3x}+C_3e^{-7x}$
   $-\frac{x}{2}-\frac{1}{14}-\frac{1}{32}e^x-\frac{1}{50}\sin x$
2. -1, 2, $3+4j$, $5-6j$
3. $y=\frac{1}{x^2}(2+e^x(x-1))^2$
4. $-\frac{4}{5}e^{-x^{5/4}}(x^{15/4}+3x^{10/4}+6x^{5/4}+6)+C$
5. b) $\left|\frac{f'(x)}{f(x)}x\right|$ c) För x nära 1
6. $a=\frac{1}{\pi}$

Tentamen 98-04-16

1. $y=C_1+C_2e^{-2x}+C_3e^{-3x}+e^{x/2}(C_4\cos\frac{\sqrt{11}x}{2}$
   $+C_5\sin\frac{\sqrt{11}x}{2})-x^3+2x^2-3\sin x+4e^x$
2. $\tan\sqrt{x^2+1}+\frac{\pi}{4}-\tan 1$
3. a) $\ln 3$ b) $\ln 3$
4. 0 resp $-\arctan 3$
5. Nej

Tentamen 98-08-28

1. $\frac{2}{3}\arctan x^{3/2}+C$
2. a) $C_1e^{3x}+C_2e^{7x}+e^{x/2}(C_3\cos\frac{\sqrt{7}x}{2}$
   $+C_4\sin\frac{\sqrt{7}x}{2})-\frac{x}{32}e^{3x}+\frac{1}{10}\cos x$
   b) Nej
3. $y=(x+1)e^{-\tan(\sin x)}$
4. a) $Q_1=\frac{1}{4}[26-3\sqrt{3}+j(-5-6\sqrt{3})]$,
   $Q_2=\frac{1}{4}[26+3\sqrt{3}+j(6\sqrt{3}-5)]$
   b) $R=\frac{1}{4}(26-5j)$, $w=-\frac{1}{3}$
5. Nej