

Gyakorló feladatok megoldásai - 2.

MA1122f – 2004/05

1.

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| (a) $e^{-3s}24/s^5$ | (b) $e^{-s}(\frac{2}{s^3} + \frac{2}{s^2} + \frac{1}{s}) + e^{-3s}(-\frac{2}{s^3} - \frac{6}{s^2} - \frac{9}{s})$ |
| (c) $e^{-s}(\frac{6}{s^4} + \frac{6}{s^3} + \frac{2}{s^2} + \frac{2}{s})$ | (d) $e^{-s} + 2e^{-2s} - 4e^{-5s}$ |
| (e) $\frac{2s}{s^3(s^2+4)}$ | (f) $\frac{1}{(s+1)(s^2+1)}$ |
| (g) $\frac{1}{s^2(s-1)}$ | (h) $\frac{s}{(s^2+1)^2}$ |

2.

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| (a) $f(t) = \frac{1}{4}t^3$ | (b) $H_2(t)(\frac{1}{3}e^{t-2} - \frac{1}{3}e^{-2t+4})$ |
| (c) $H_2(t)(2e^{t-2} \cos(t-2))$ | (d) $\frac{1}{2}H_2(t)(e^{2t-4} - e^{-2t+4})$ |
| (e) $H_1(t) + H_2(t) - H_3(t) - H_4(t)$ | (f) $\frac{1}{6}t^3 - t + \sin(t)$ |
| (g) $-\frac{1}{5}e^{-t} + \frac{1}{5}\cos(2t) + \frac{2}{5}\sin(2t)$ | (h) $\frac{1}{5}te^{-t} + \frac{2}{25}e^{-t} - \frac{2}{25}\cos(2t) - \frac{3}{50}\sin(2t)$ |

3.

- (a) $1 - \cos t + \sin t - H_{\pi/2}(t)(1 - \sin t)$
- (b) $e^{-t} \sin t + \frac{1}{2}H_{\pi}(t) \left(1 + e^{-(t-\pi)}(\cos t + \sin t)\right) - \frac{1}{2}H_{2\pi}(t) \left(1 - e^{-(t-2\pi)}(\cos t + \sin t)\right)$
- (c) $g(t) + H_{\pi}(t)g(t - \pi), \quad g(t) = \frac{4}{14}(-4 \cos t + \sin t + 4e^{-t/2} \cos t + e^{-t/2} \sin t)$
- (d) $\frac{1}{6}(1 - H_{2\pi}(t))(2 \sin t - \sin 2t)$
- (e) $H_1(t)g(t - 1) - H_2(t)g(t - 2), \quad g(t) = -1 + (\cos t + \operatorname{ch} t)/2$
- (f) $e^{-t} \cos t + e^{-t} \sin t - H_{\pi}(t)e^{-(t-\pi)} \sin t$
- (g) $\frac{1}{2}H_{\pi}(t) \sin 2t - \frac{1}{2}H_{2\pi}(t) \sin 2t$
- (h) $\frac{1}{5} \cos t + \frac{2}{5} \sin t - \frac{1}{5}e^{-t} \cos t - \frac{3}{5}e^{-t} \sin t - H_{\pi/2}(t)e^{-(t-\pi/2)} \cos t$
- (i) $-\frac{6}{85} \cos(3t) - \frac{7}{85} \sin(3t) + \frac{6}{85} e^{-t} \cos(t) + \frac{27}{85} e^{-t} \sin(t)$
- (j) $\frac{1}{5} e^{-t/2} \cos(t) - \frac{9}{10} e^{-t/2} \sin(t) + \frac{4}{5} - \frac{4}{5} H_{\pi}(t)$
 $-\frac{4}{5} H_{\pi}(t)e^{-(t-\pi)/2} \cos(t) - \frac{2}{5} H_{\pi}(t)e^{-(t-\pi)/2} \sin(t)$