

MAP 2302

Quiz — Spring 2020
Sections 7.1 & 7.2

Name: _____

Date: _____

KEY

Evaluate each Laplace transform:

2 points
each

$$1) \mathcal{L}\{t^4\} = \frac{4!}{s^{4+1}} = \frac{24}{s^5}$$

$$2) \mathcal{L}\{t^2 - e^{-3t} + 6\} = \frac{2}{s^3} - \frac{1}{s+3} + \frac{6}{s}$$

$$3) \mathcal{L}\{\cos 6t - \sin 8t\} = \frac{s}{s^2+36} - \frac{8}{s^2+64}$$

$$4) \mathcal{L}\left\{\frac{(1+e^{2t})^2}{1+2e^{2t}+e^{4t}}\right\} = \frac{1}{s} + \frac{2}{s-2} + \frac{1}{s-4}$$

$$5) \mathcal{L}\left\{\frac{5t^3 - 4e^{-6t} + \cos 9t}{5\left(\frac{3!}{s^{3+1}}\right)}\right\} = \frac{30}{s^4} - \frac{4}{s+6} + \frac{s}{s^2+81}$$

Evaluate each inverse Laplace transform

2 points
each

$$6) \mathcal{L}^{-1}\left\{\frac{s+1}{s^2+2}\right\}$$

$$= \mathcal{L}^{-1}\left\{\frac{s}{s^2+2}\right\} + \frac{1}{\sqrt{2}} \mathcal{L}^{-1}\left\{\frac{1}{s^2+2}\right\} = \cos \sqrt{2}t + \frac{1}{\sqrt{2}} \sin \sqrt{2}t$$

$$7) \mathcal{L}^{-1} \left\{ \frac{1}{s^2 + s - 20} \right\} = \boxed{-\frac{1}{9} e^{-5t} + \frac{1}{9} e^{4t}}$$

$$= \mathcal{L}^{-1} \left\{ \frac{1}{(s+5)(s-4)} \right\}$$

$$= \mathcal{L}^{-1} \left\{ \frac{A}{s+5} + \frac{B}{s-4} \right\} \quad A = -\frac{1}{9}, B = \frac{1}{9}$$

$$8) \mathcal{L}^{-1} \left\{ \frac{1}{4s-3} \right\} = \boxed{\frac{1}{4} e^{3/4 t}}$$

$$= \mathcal{L}^{-1} \left\{ \frac{1}{4(s-\frac{3}{4})} \right\}$$

$$9) \mathcal{L}^{-1} \left\{ \frac{4}{s} + \frac{s}{s^2} - \frac{2}{s-4} \right\} = \boxed{4 + 1 - 2e^{4t}}$$

$A=5 \quad \frac{s}{s^2} = \frac{1}{s}$

$$= \boxed{4 + 5t - 2e^{4t}}$$

$$10) \mathcal{L}^{-1} \left\{ \frac{-2s+6}{s^2+16} \right\}$$

$$= \mathcal{L}^{-1} \left\{ \frac{-2s}{s^2+16} \right\} + \mathcal{L}^{-1} \left\{ \frac{6}{s^2+16} \right\}$$

$$= -2 \mathcal{L}^{-1} \left\{ \frac{s}{s^2+16} \right\} + \frac{6}{4} \mathcal{L}^{-1} \left\{ \frac{4}{s^2+16} \right\}$$

$$= \boxed{-2 \cos 4t + \frac{3}{2} \sin 4t}$$