Name: _____ ECE 3510 homework 2 d

Homework should be turned in to Canvas as a .pdf file by 11:59pm on the due date.

Good LaPlace Transform tables: Nielson p.595 (7th ed.,p.547), Lathi p.372, Bodson p.5, Nise 3rd ed., p.40, Class handouts

Good LaPlace Property tables: Nielson p.601 (7th ed.,p.553), Lathi p.389, Bodson p.8, Nise 3rd ed., p.41, Class handouts

For problems 1 & 2: Don't just write down what the table shows.
You must show some work of your own.
You may use simpler table entries together with properties of the Laplace transform.

1. Find the Laplace transform of the following functions: See instructions above
   a) $u(t)$

   b) $\sin(\omega \cdot t) \cdot u(t)$

   c) $t \cdot u(t)$

2. Find the Laplace transform of the following functions: See instructions above

a) $e^{-a \cdot t} \cdot \sin(\omega \cdot t) \cdot u(t)$

b) $e^{-a \cdot t} \cdot \cos(\omega \cdot t) \cdot u(t)$

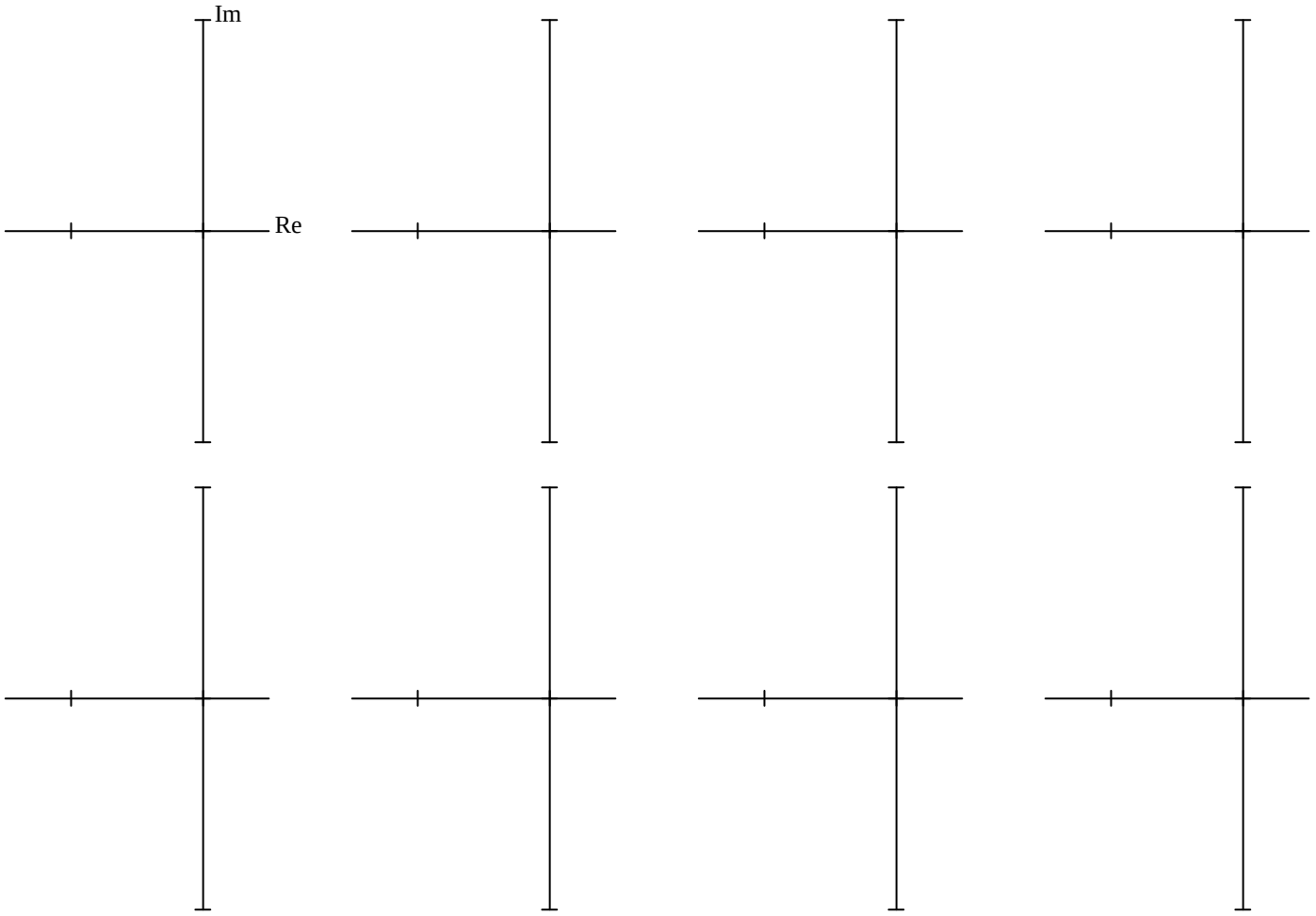
ECE 3510 homework 2 p2

3. Look at the figures on the **next page**. Each set of real (horizontal) and imaginary (vertical) axes show the poles of a signal transform on the s-plane.
   a) Find the best matching time-domain signal or answer in "Answers for problem 3" section (following page). Answers may be used more than once or not at all, but make a little check mark next to each on that you do use. Don't overlook answers A and B, which are written only (no figure).

   The axes all have the same scaling. All time scales on the ANSWERS page are the same. Your answers should make sense relative to one another.

   dbl = double pole at that location

   b), c) and d) are on next page. Answer d) below. You may not need all of the axes drawn below.



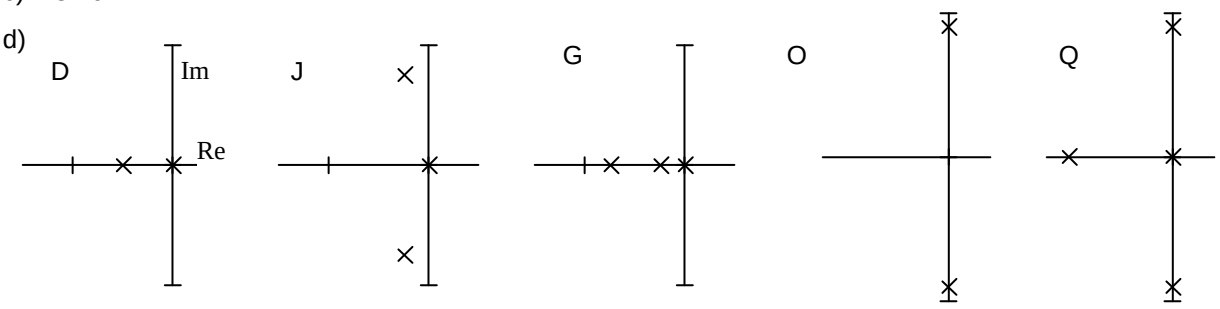
Answers

1. a) $\frac{1}{s}$ b) $\frac{\omega}{s^2+\omega^2}$ c) $\frac{1}{s^2}$ 2. a) $\frac{\omega}{(s+a)^2+\omega^2}$ b) $\frac{(s+a)}{(s+a)^2+\omega^2}$

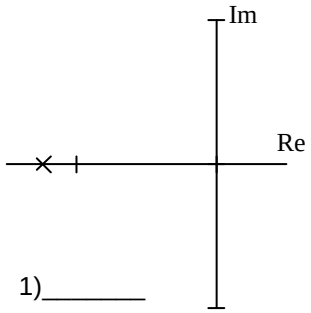
3. a) 1) E 2) F 3) K 4) C 5) H or L 6) L 7) M 8) N 9) A 10) R 11) S 12) P b) 7 10 11

   c) 7 8 10 11 12

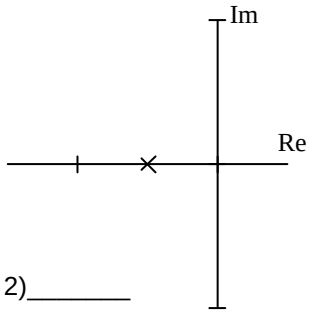
   d)



3. See instructions on previous page



1)_____



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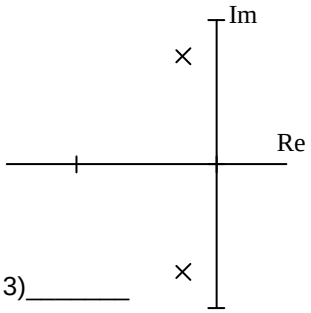
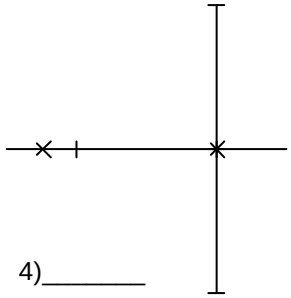
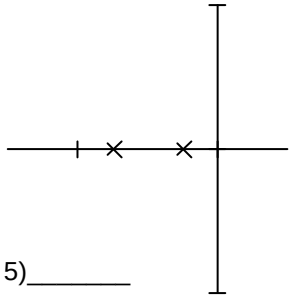


3)_____



4)_____



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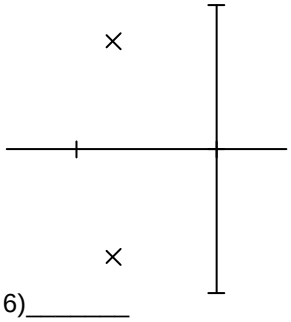

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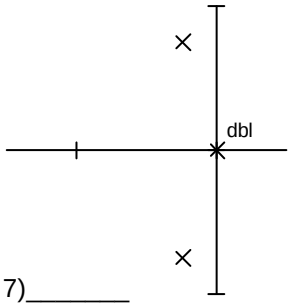

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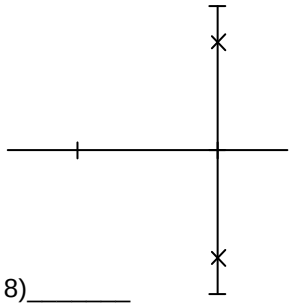

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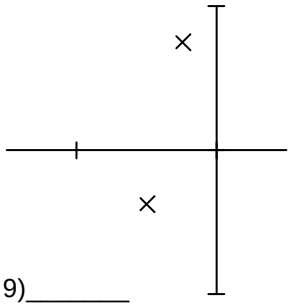

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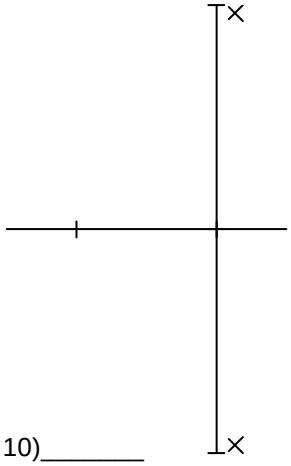

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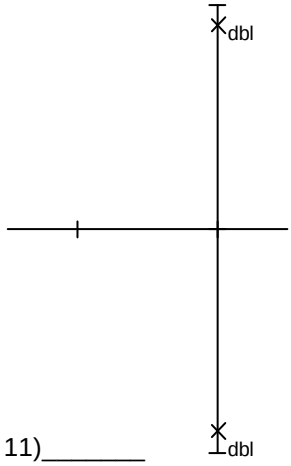

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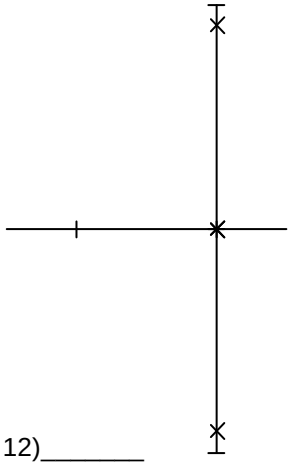


12)_____

b) List those numbers above that represent signals that are UNBOUNDED.

c) List those numbers above that represent signals that DO NOT converge.

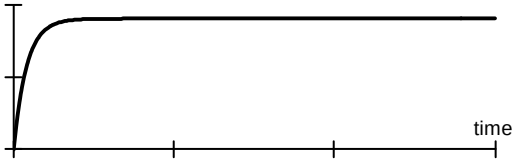
d) Several of the answers on the next page were not used.
For each of the answers that were **not** used, draw the poles of that time-domain signal on a set of real and imaginary axes (an s-plane). Scale your axes just like the ones above.

Answers for problem 3 All horizontal axes are time.

A No real time-domain answer could match these pole(s)

B None of these time-domain answers match these poles

C



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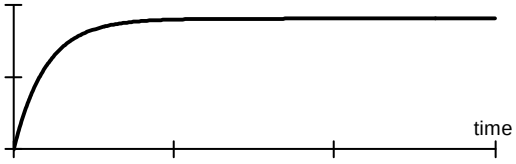

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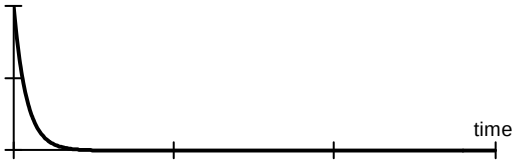

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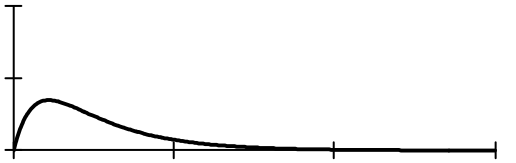

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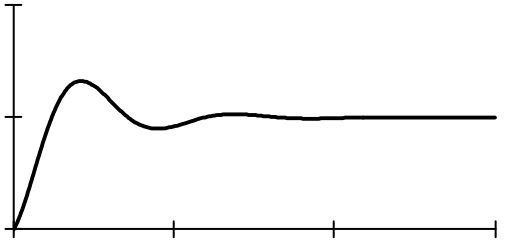

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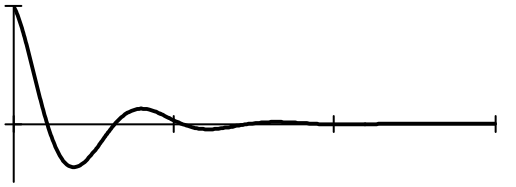

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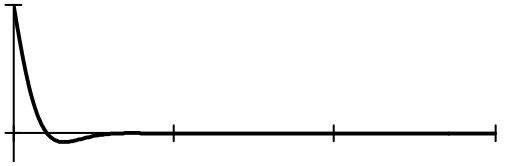

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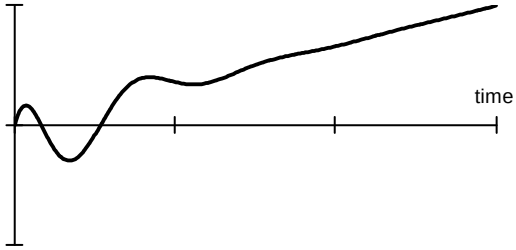

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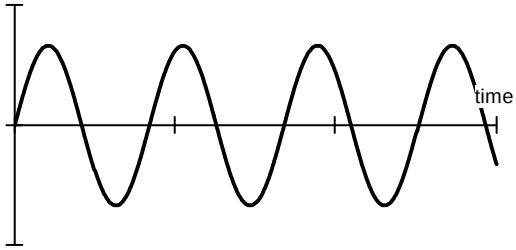

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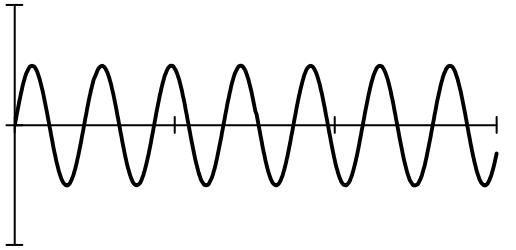

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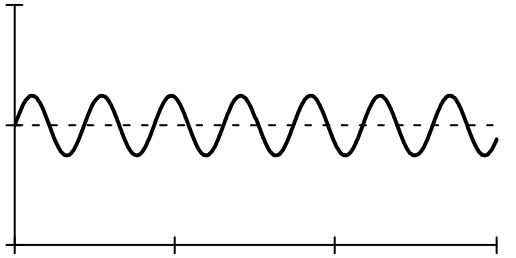

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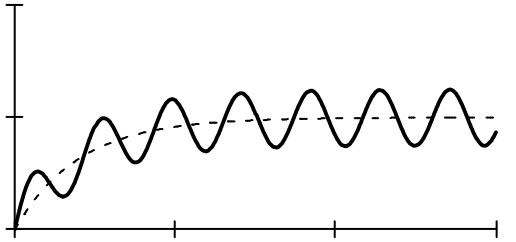

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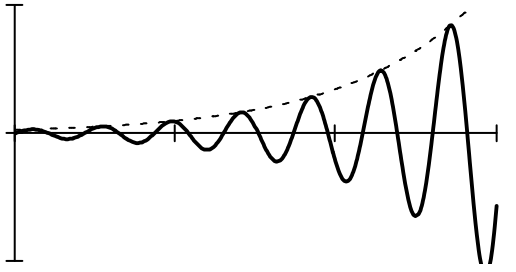

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