NAME: SOLUTION KEY ROLL #: _____

ChE381A Process Dynamics & Control **Jan-Apr 2015**

Quiz 1 Paper **A** **30 minutes; 14 points**

• 2 marks for a correct answer. *Negative marking*: One point will be deducted per wrong answer.

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1. A first-order system with process gain K and time constant τ is subjected to an impulse input of strength A at $t = 0$. The value of the output response at time $t = 0^+$ is:
(a) $\tau/(AK)$ (b) 0 (c) A (d) AK/τ

2. A unit-step input is given to a process described by the transfer function $(s-4)/(s^2+3s+2)$. The initial value (at $t = 0^+$) of the derivative of the output variable in response to the step input is:
(a) -2 (b) 0 (c) 1 (d) 2

3. The poles and zeros of the transfer function

$$G(s) = \frac{s+5}{s(s^2+16)}$$

are respectively:
(a) 4, -4, 0, 5 (b) $4j$, $-4j$, 0, -5 (c) $4j$, $-4j$, 0, 5 (d) 4, 4, 0, -5

4. The ultimate steady-state response of the system with

$$G(s) = \frac{8(4s+2)}{(3s^2+2s+10)}$$

to step input of magnitude 5 is:
(a) 8 (b) 16/10 (c) 40 (d) 16

5. The inverse Laplace transform of the function $f(s) = \frac{s+4}{s(1-s)}$ is:
(a) $5-4\exp[t]$ (b) $4-5\exp[-t]$ (c) $4-5\exp[t]$ (d) $5-4\exp[-t]$

6. The steady-state gain of a process described by the transfer function (given below) is:

$$G(s) = \frac{(5s+4)}{(8s^2+6s+2)}$$

(a) 2 (b) 4 (c) 5/8 (d) 0

7. The second-order system given by

$$G(s) = \frac{5}{64s^2+4s+2}$$

is:
(a) over-damped (b) under-damped (c) critically damped (d) unstable