PRINT YOUR NAME HERE:

HONOR CODE PLEDGE: "I have neither given nor received aid on this exam, nor have I concealed any violations of the honor code." Closed book; 2 sides of 8.5×11 "cheat sheet."

SIGN YOUR NAME HERE:

CIRCLE ONE: Undergraduate Graduate

Write your answer to each question in the answer space to the right of that question. Problems #1-15 are multiple choice (same as fill-in-the-blank) worth 5 points each.

1. The period of the discrete-time sinusoid $4\cos(0.56\pi n + 0.7)$ is:
   (a) 12.5 **(b)** 25 **(c)** 40 **(d)** 50 **(e)** Not periodic

2. $\sin(40\pi t) + 2\sin(160\pi t)$ and which of these are identical after sampling at 100Hz:
   (a) 0 **(b)** $-\sin(40\pi t)$ **(c)** $3\sin(40\pi t)$ **(d)** $-\sin(160\pi t)$ **(e)** $3\sin(160\pi t)$

3. The convolution $\{1,2\} * \{3,4,5\} =$: **(a)** $\{3,6,4,10\}$ **(b)** $\{3,10,13,10\}$
   (c) $\{3,10,14,10\}$ **(d)** $\{3,11,13,10\}$ **(e)** $\{3,11,14,10\}$

4. The system (transfer) function if $2^n u[n] \rightarrow \overline{|LTI|} \rightarrow u[n] + 2^n u[n]$ is:
   (a) $\frac{1+2z}{z+2}$ **(b)** $1 + \frac{1}{z+2}$ **(c)** $\frac{2z-3}{z-1}$ **(d)** $\frac{1}{z^2-3z+2}$ **(e)** $1 + \frac{1}{z-1}$

5. The system (transfer) function if $\{\underline{1},2,3\} \rightarrow \overline{|LTI|} \rightarrow \{\underline{4},5,6\}$ is:
   (a) $\frac{3z^2+2z+1}{6z^2+5z+4}$ **(b)** $\frac{6z^2+5z+4}{3z^2+2z+1}$ **(c)** $\frac{z^2+2z+3}{4z^2+5z+6}$ **(d)** $\frac{4z^2+5z+6}{z^2+2z+3}$ **(e)** $1 + z + z^2$

6. The z-transform of $(2)^n u[n] + (-4)^n u[n]$ is:
   (a) $\frac{1}{z^2+2z-8}$ **(b)** $\frac{z^2+z}{z^2+2z-8}$ **(c)** $2\frac{z^2+z}{z^2+2z-8}$ **(d)** $\frac{z^2-z}{z^2+2z-8}$ **(e)** $2\frac{z^2-z}{z^2+2z-8}$

7. The inverse z-transform of $\frac{2z}{z^2+1}$ is:
   (a) $(-1)^n$ **(b)** $2\cos(\pi n)u[n]$ **(c)** $2\sin(\pi n)u[n]$ **(d)** $2\cos(\frac{\pi}{2}n)u[n]$ **(e)** $2\sin(\frac{\pi}{2}n)u[n]$

8. The inverse z-transform of $\frac{z^2-5z+6}{z^2(z-1)}$ is:
   (a) $\{\underline{1},-5,6\} * u[n]$ **(b)** $\{\underline{1},-6\}$ **(c)** $\{\underline{1},-5,6\} * u[n-1]$ **(d)** $\{\underline{0},1,-6\}$

9. The impulse response if $2^n u[n] + 4^n u[n] \rightarrow \overline{|LTI|} \rightarrow \delta[n]$ is:
   (a) $(\frac{1}{2})^n u[n] + (\frac{1}{4})^n u[n]$ **(b)** $\{1,2,4\}$ **(c)** $\{1,-2,-4\}$ **(d)** $C3^n$ for $n > 3$ for some C

10. The zero-input response for $y(n)$-$2y(n-1)$=$2x(n)$+$3x(n-1)$ with $y(-1)$=1 is:
    (a) $2^{n+1}u(n)$ (b) $2^n u(n)$ (c) $2^{n-1}u(n-1)$ (d) $2^n u(n)$+$2^{n-1}u(n-1)$ (e) 0

For problems #11-15: An LTI system has transfer function $H(z) = \frac{z}{(z-1)(z-2)}$.

11. The poles and zeros are, respectively,
(a) $\{0\};\{1,2\}$ (b) $\{0\};\{-1,-2\}$ (c) $\{1,2\};\{0\}$ (d) $\{-1,-2\};\{0\}$

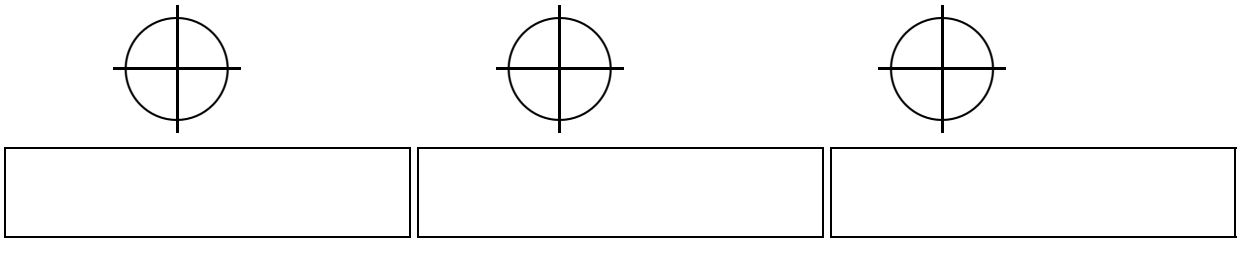
12. The difference equation is: (a) $y[n]-3y[n-1]+2y[n-2]=x[n-2]$
(b) $y[n]-3y[n-1]+2y[n-2]=x[n-1]$ (c) $y[n]-3y[n-1]+2y[n-2]=x[n]$
(d) $y[n]+3y[n-1]+2y[n-2]=x[n-1]$ (e) $y[n]+3y[n-1]+2y[n-2]=x[n]$

13. The impulse response $h[n]$ is:
(a) $2^n u[n]$ (b) $2^n u[n]+u[n]$ (c) $2^n u[n]-u[n]$ (d) $3(2)^n u[n]+2u[n]$ (e) $3(2)^n u[n]-2u[n]$

14. The response to $x[n]=\{\underline{2},-6,4\}$ is:
(a) $2^n u(n)+u(n)$ (b) $2^n u[n]-u[n]$ (c) $2^{n+1}u[n]+3u[n]$ (d) $2\delta[n+1]$ (e) $2\delta[n-1]$

15. The response to $x[n]=\delta[n]-\delta[n-1]$ is:
(a) $2^{n+1}u[n+1]$ (b) $2^n u[n]$ (c) $2^{n-1}u[n-1]$ (d) $2^n u[n]+u[n]$ (e) $2^n u[n]-2^{n-1}u[n-1]$

[24] 16. $X(z)=\frac{z}{z-0.2}+\frac{z}{z-2}$ has 3 different inverse z-transforms. For each one, compute:
[3@3] **(a)** $x[n]$ [3@3] **(b)** ROCs [3@1] **(c)** if stable [3@1] **(d)** if causal. Write below.



STABLE **CAUSAL** **STABLE** **CAUSAL** **STABLE** **CAUSAL**

[1] 17. Did you: (a) PRINT your name; (b) SIGN your name; (c) CIRCLE grad or undergrad?