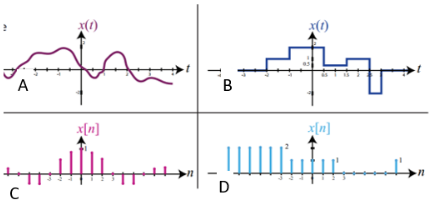
Quiz 1

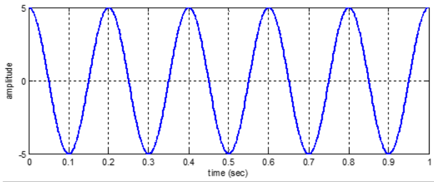
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

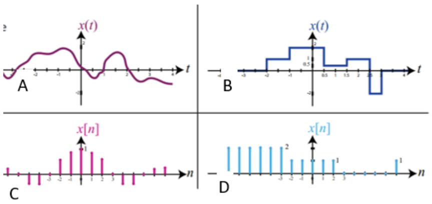
A=__________ f=________ T=________ φ=________



Quiz 1

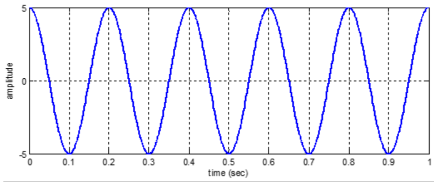
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

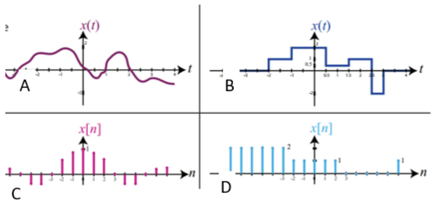
A=__________ f=________ T=________ φ=________



Quiz 1

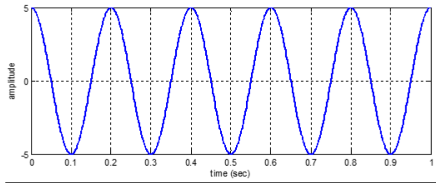
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

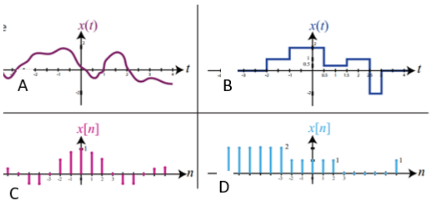
A=__________ f=________ T=________ φ=________



Quiz 1

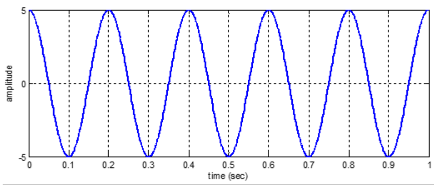
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

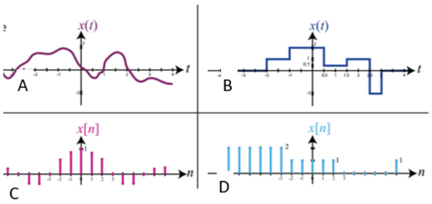
A=__________ f=________ T=________ φ=________



Quiz 1

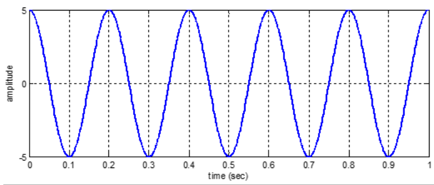
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

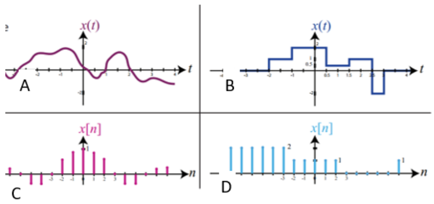
A=__________ f=________ T=________ φ=________



Quiz 1

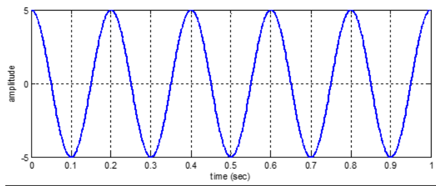
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

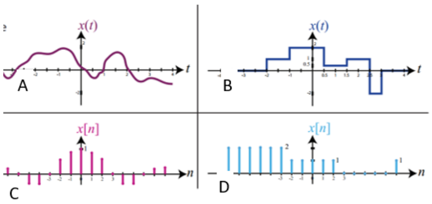
A=__________ f=________ T=________ φ=________



Quiz 1

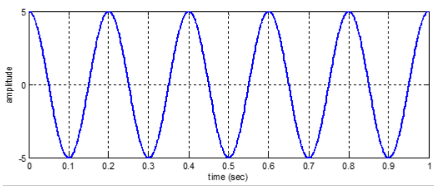
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

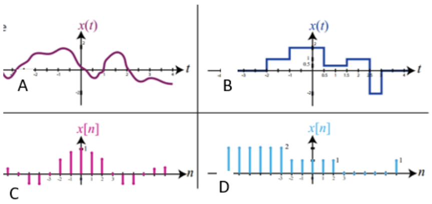
A=__________ f=________ T=________ φ=________



Quiz 1

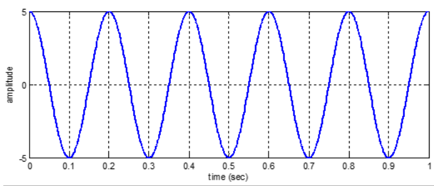
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

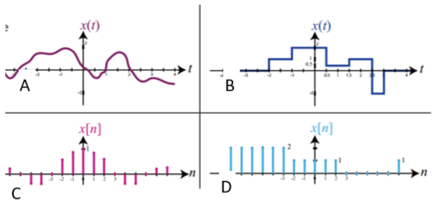
A=__________ f=________ T=________ φ=________



Quiz 1

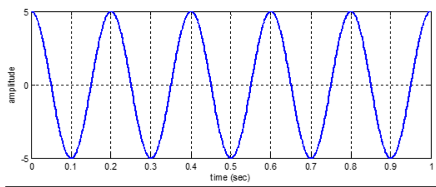
姓名: ______________

1. Which one is analog signal? ______



2. Find the parameters for the following sinusoid:

A=__________ f=________ T=________ φ=________



Review Card 2

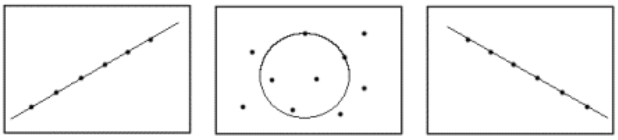
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

Review Card 2

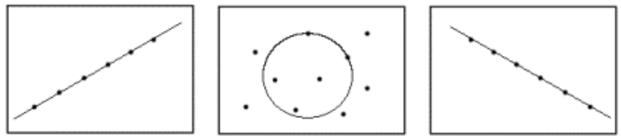
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

Review Card 2

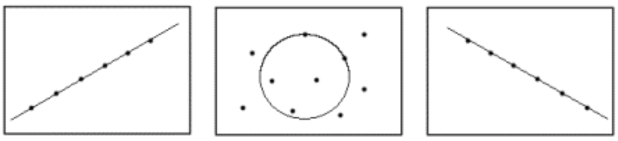
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

Review Card 2

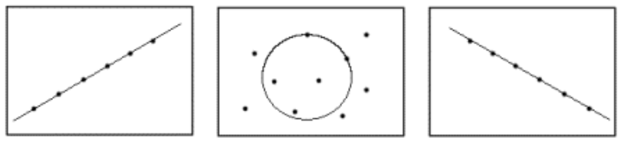
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

Review Card 2

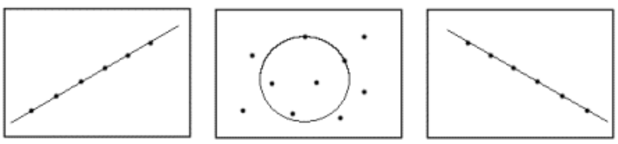
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

Review Card 2

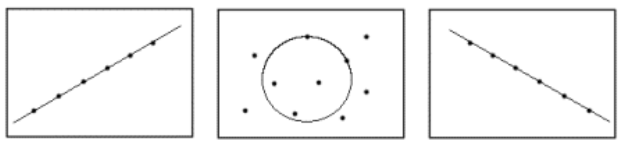
Name: ___________

1. For a random signal {2 3 1 5 3 4 3 1}, calculate the following descriptive statistics:

Mean=_______, Median=_________, Mode=______

Standard Deviation=________

2. Determine the following correlation coefficients (r):



r=_______ r=______ r=_____

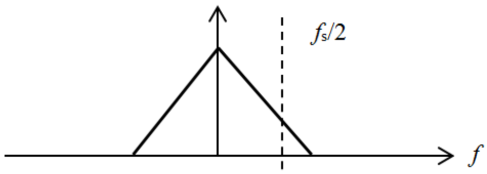
Review Card 3

Name: __________

1. If an ADC has a resolution of 12 bit and a reference voltage of 5 volts, the digital output for an analog input of 1.56 volts will be =________ (in decimal form)

2. If we want to digitize an analog signal with frequency of interest not higher than 8 kHz, the minimal sampling frequency should be _______; The anti-aliasing filter prior to digitizing is a _______(analog or digital) ____ _____(low- or high- pass) filter with a cut-off frequency of _________.

3. Draw the side effect if an analog signal is sampled as follows:



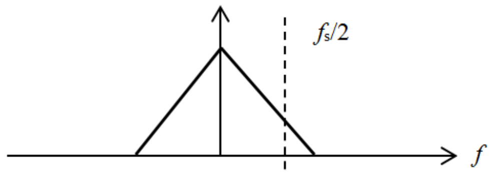
Review Card 3

Name: __________

1. If an ADC has a resolution of 12 bit and a reference voltage of 5 volts, the digital output for an analog input of 1.56 volts will be =________ (in decimal form)

2. If we want to digitize an analog signal with frequency of interest not higher than 8 kHz, the minimal sampling frequency should be _______; The anti-aliasing filter prior to digitizing is a _______(analog or digital) ____ _____(low- or high- pass) filter with a cut-off frequency of _________.

3. Draw the side effect if an analog signal is sampled as follows:



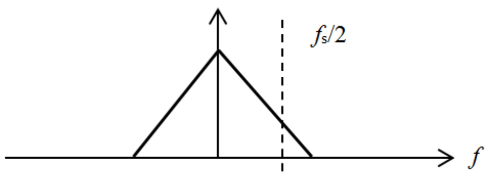
Review Card 3

Name: __________

1. If an ADC has a resolution of 12 bit and a reference voltage of 5 volts, the digital output for an analog input of 1.56 volts will be =________ (in decimal form)

2. If we want to digitize an analog signal with frequency of interest not higher than 8 kHz, the minimal sampling frequency should be _______; The anti-aliasing filter prior to digitizing is a _______(analog or digital) ____ _____(low- or high- pass) filter with a cut-off frequency of _________.

3. Draw the side effect if an analog signal is sampled as follows:



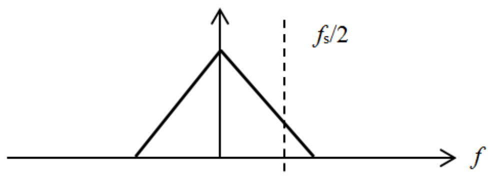
Review Card 3

Name: __________

1. If an ADC has a resolution of 12 bit and a reference voltage of 5 volts, the digital output for an analog input of 1.56 volts will be =________ (in decimal form)

2. If we want to digitize an analog signal with frequency of interest not higher than 8 kHz, the minimal sampling frequency should be _______; The anti-aliasing filter prior to digitizing is a _______(analog or digital) ____ _____(low- or high- pass) filter with a cut-off frequency of _________.

3. Draw the side effect if an analog signal is sampled as follows:



Review Card 4

Name: ___________

Read the datasheet of a DAC chip from Texas Instruments below and answer the following questions:

DESCRIPTION

The DAC161S997 is a very low power 16-bit ΣΔ digital-to-analog converter (DAC) for transmitting an analog output current over an industry standard 4-20mA current loop. The DAC161S997 has a simple 4-wire SPI for data transfer and configuration of the DAC functions. To reduce power and component count in compact loop-powered applications, the DAC161S997 contains an internal ultra-low power voltage reference and an internal oscillator. The low power consumption of the DAC161S997 results in additional current being available for the remaining portion of the system. The loop drive of the DAC161S997 interfaces to a Highway Addressable Remote Transducer (HART) modulator, allowing injection of FSK modulated digital data into the 4-20mA current loop. This combination of specifications and features makes the DAC161S997 ideal for 2- and 4-wire industrial transmitters. The DAC161S997 is available in a 16-pin 4 mm × 4 mm WQFN package and is specified over the extended industrial temperature range of –40°C to +105°C.

1. The resolution of the DAC chip is: ____________

2. The way it transfers data between the chip and the computer is ___________ (parallel 并行 or serial 串行), because ____

____

3. For a reference voltage of 3.3v, the voltage that 1 LSB represents is ______; the output analog voltage will be _____ for a digital input of 0x78.

Review Card 4

Name: ___________

Read the datasheet of a DAC chip from Texas Instruments below and answer the following questions:

DESCRIPTION

The DAC161S997 is a very low power 16-bit ΣΔ digital-to-analog converter (DAC) for transmitting an analog output current over an industry standard 4-20mA current loop. The DAC161S997 has a simple 4-wire SPI for data transfer and configuration of the DAC functions. To reduce power and component count in compact loop-powered applications, the DAC161S997 contains an internal ultra-low power voltage reference and an internal oscillator. The low power consumption of the DAC161S997 results in additional current being available for the remaining portion of the system. The loop drive of the DAC161S997 interfaces to a Highway Addressable Remote Transducer (HART) modulator, allowing injection of FSK modulated digital data into the 4-20mA current loop. This combination of specifications and features makes the DAC161S997 ideal for 2- and 4-wire industrial transmitters. The DAC161S997 is available in a 16-pin 4 mm × 4 mm WQFN package and is specified over the extended industrial temperature range of –40°C to +105°C.

1. The resolution of the DAC chip is: ____________

2. The way it transfers data between the chip and the computer is ___________ (parallel 并行 or serial 串行), because ____

____

3. For a reference voltage of 3.3v, the voltage that 1 LSB represents is ______; the output analog voltage will be _____ for a digital input of 0x78.

Review Card 4

Name: ___________

Read the datasheet of a DAC chip from Texas Instruments below and answer the following questions:

DESCRIPTION

The DAC161S997 is a very low power 16-bit ΣΔ digital-to-analog converter (DAC) for transmitting an analog output current over an industry standard 4-20mA current loop. The DAC161S997 has a simple 4-wire SPI for data transfer and configuration of the DAC functions. To reduce power and component count in compact loop-powered applications, the DAC161S997 contains an internal ultra-low power voltage reference and an internal oscillator. The low power consumption of the DAC161S997 results in additional current being available for the remaining portion of the system. The loop drive of the DAC161S997 interfaces to a Highway Addressable Remote Transducer (HART) modulator, allowing injection of FSK modulated digital data into the 4-20mA current loop. This combination of specifications and features makes the DAC161S997 ideal for 2- and 4-wire industrial transmitters. The DAC161S997 is available in a 16-pin 4 mm × 4 mm WQFN package and is specified over the extended industrial temperature range of –40°C to +105°C.

1. The resolution of the DAC chip is: ____________

2. The way it transfers data between the chip and the computer is ___________ (parallel 并行 or serial 串行), because ____

____

3. For a reference voltage of 3.3v, the voltage that 1 LSB represents is ______; the output analog voltage will be _____ for a digital input of 0x78.

Review Card 4

Name: ___________

Read the datasheet of a DAC chip from Texas Instruments below and answer the following questions:

DESCRIPTION

The DAC161S997 is a very low power 16-bit ΣΔ digital-to-analog converter (DAC) for transmitting an analog output current over an industry standard 4-20mA current loop. The DAC161S997 has a simple 4-wire SPI for data transfer and configuration of the DAC functions. To reduce power and component count in compact loop-powered applications, the DAC161S997 contains an internal ultra-low power voltage reference and an internal oscillator. The low power consumption of the DAC161S997 results in additional current being available for the remaining portion of the system. The loop drive of the DAC161S997 interfaces to a Highway Addressable Remote Transducer (HART) modulator, allowing injection of FSK modulated digital data into the 4-20mA current loop. This combination of specifications and features makes the DAC161S997 ideal for 2- and 4-wire industrial transmitters. The DAC161S997 is available in a 16-pin 4 mm × 4 mm WQFN package and is specified over the extended industrial temperature range of –40°C to +105°C.

1. The resolution of the DAC chip is: ____________

2. The way it transfers data between the chip and the computer is ___________ (parallel 并行 or serial 串行), because ____

____

3. For a reference voltage of 3.3v, the voltage that 1 LSB represents is ______; the output analog voltage will be _____ for a digital input of 0x78.

Review Card 5

Name: ___________

1. Complete the number conversion between different bases:

$(1101.0111)_2$=(________________________________)$_{10}$

$(4F.6E)_{16}$ =(________________________________)$_{10}$

$(87.35)_{10}$ =(________________________________)$_{2}$

$(CD.6A)_{16}$=(________________________________)$_{2}$

$(99.025)_{10}$=(________________________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{8}$

2. The range of a signed char (8-bit, 2s complement) is: _ _________

3. Represent $(-13)_{10}$ in different ways (6 bit):

Sign-and-Magnitude: ____________

1s Complement: ________________

2s Complement: ________________

Review Card 5

Name: ___________

1. Complete the number conversion between different bases:

$(1101.0111)_2$=(________________________________)$_{10}$

$(4F.6E)_{16}$ =(________________________________)$_{10}$

$(87.35)_{10}$ =(________________________________)$_{2}$

$(CD.6A)_{16}$=(________________________________)$_{2}$

$(99.025)_{10}$=(________________________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{8}$

2. The range of a signed char (8-bit, 2s complement) is: _ _________

3. Represent $(-13)_{10}$ in different ways (6 bit):

Sign-and-Magnitude: ____________

1s Complement: ________________

2s Complement: ________________

Review Card 5

Name: ___________

1. Complete the number conversion between different bases:

$(1101.0111)_2$=(________________________________)$_{10}$

$(4F.6E)_{16}$ =(________________________________)$_{10}$

$(87.35)_{10}$ =(________________________________)$_{2}$

$(CD.6A)_{16}$=(________________________________)$_{2}$

$(99.025)_{10}$=(________________________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{8}$

2. The range of a signed char (8-bit, 2s complement) is: _ _________

3. Represent $(-13)_{10}$ in different ways (6 bit):

Sign-and-Magnitude: ____________

1s Complement: ________________

2s Complement: ________________

Review Card 5

Name: ___________

1. Complete the number conversion between different bases:

$(1101.0111)_2$=(________________________________)$_{10}$

$(4F.6E)_{16}$ =(________________________________)$_{10}$

$(87.35)_{10}$ =(________________________________)$_{2}$

$(CD.6A)_{16}$=(________________________________)$_{2}$

$(99.025)_{10}$=(________________________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{16}$

$(11100110.01111001)_2$=(______________________)$_{8}$

2. The range of a signed char (8-bit, 2s complement) is: _ _________

3. Represent $(-13)_{10}$ in different ways (6 bit):

Sign-and-Magnitude: ____________

1s Complement: ________________

2s Complement: ________________

Review Card 6

Name: ___________

1. For an 8-bit binary number 1001 1101,

(A) If it represents an **unsigned** number, the decimal value is ________;

(B) If it represents a **signed** number, the decimal value is:

a) _______ if it is in sign-and-magnitude form;

b) _______ if it is in 1s complement form;

c) _______ if it is in 2s complement form;

2. The three parts of a float number is: ______, _______ and _________. The advantage of float number is: _____ ____. In IEEE standard, it uses _______ bits to represent a number of **single precision**, and ________bits for **double precision**.

3. Rewrite the following number in **base-2** normalized form and represent it by a 10-digit float number (4 digit for exponent part):

(A) $(13.25)_{10}$

a) normalized form: __________________

b) float-number representation:

(B) $(-0.1325)_{10}$

a) normalized form: __________________

b) float-number representation (2s complement):

Review Card 6

Name: ___________

1. For an 8-bit binary number 1001 1101,

(A) If it represents an **unsigned** number, the decimal value is ________;

(B) If it represents a **signed** number, the decimal value is:

a) _______ if it is in sign-and-magnitude form;

b) _______ if it is in 1s complement form;

c) _______ if it is in 2s complement form;

2. The three parts of a float number is: ______, _______ and _________. The advantage of float number is: _____ ____. In IEEE standard, it uses _______ bits to represent a number of **single precision**, and ________bits for **double precision**.

3. Rewrite the following number in **base-2** normalized form and represent it by a 10-digit float number (4 digit for exponent part):

(A) $(13.25)_{10}$

a) normalized form: __________________

b) float-number representation:

(B) $(-0.1325)_{10}$

a) normalized form: __________________

b) float-number representation (2s complement):

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 7

Name: ___________

1. A linear time-invariant system should have the following three properties: ___________, ___________ and ____ ____________.

2. Decide whether the system described by the following formula is a linear time-invariant system:

$$y(n) = nx(n)$$

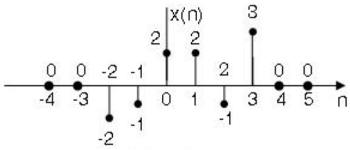
- ✧ Linear? ___________
- ✧ Time-invariant? _____________

Review Card 8

Name: ___________

1. There are usually three ways to uniquely characterize a LTI system: _______________, ________________ and _________________.

2. Please rewrite $x(n)$ by the form of impulse decomposition:



$x(n)$=____

3. If the length of an input $x(n)$ is 8 points and the length of the system impulse response $h(n)$ is 7 points, then the convolution of $x(n)$ and $h(n)$ would be ______ points.

4. Please calculate the convolution of the following two discrete signals through both the input and output side algorithms:

$x(n)=\{1,3,4,2,5\}$

$h(n)=\{6,5,7\}$

(A) The input side algorithm:

$y_0(n)$={_____________________________________}

$y_1(n)$= {_____________________________________}

$y_2(n)$= {_____________________________________}

$y_3(n)$= {_____________________________________}

$y_4(n)$= {_____________________________________}

Convolution={___________________________________}

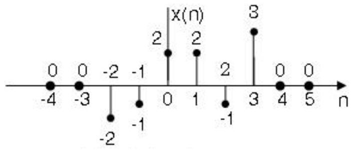
(B) Draw the steps as $h(n)$ moved along $x(n)$, as well as the corresponding element of $y(n)$ for each step:

Review Card 8

Name: ___________

1. There are usually three ways to uniquely characterize a LTI system: _______________, ________________ and _________________.

2. Please rewrite $x(n)$ by the form of impulse decomposition:



$x(n)$=____

3. If the length of an input $x(n)$ is 8 points and the length of the system impulse response $h(n)$ is 7 points, then the convolution of $x(n)$ and $h(n)$ would be ______ points.

4. Please calculate the convolution of the following two discrete signals through both the input and output side algorithms:

$x(n)=\{1,3,4,2,5\}$

$h(n)=\{6,5,7\}$

(A) The input side algorithm:

$y_0(n)$={_____________________________________}

$y_1(n)$= {_____________________________________}

$y_2(n)$= {_____________________________________}

$y_3(n)$= {_____________________________________}

$y_4(n)$= {_____________________________________}

Convolution={___________________________________}

(B) Draw the steps as $h(n)$ moved along $x(n)$, as well as the corresponding element of $y(n)$ for each step:

Review Card 9

Name: ___________

1. For a continuous signal $f(t)$, the formula of its Fourier transform is: ____________________________; For a discrete signal $x(n)$, the formula of its Fourier transform is: ______________________________.

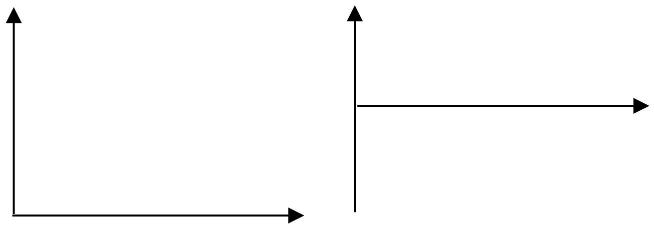
2. If the sampling frequency is 20Hz and a signal $x(n)$ has 10 points, then $x(n)$ can be decomposed into ______(填数目) sinusoid components. The frequencies of these sinusoids are: ____.

3. If the sampling frequency is 10Hz and a signal $x(n)$ has 10 points, then frequency resolution of the spectrum Δf =____. Assuming that the first 6 points of $X(k)$ [the Fourier transform of $x(n)$] are: 4, 3+4i, -2+3i, 4-2i, -1-i, -3.

(A) How many points are missing for $X(k)$? ___________

The missing points are: ____________________________

(B) Draw the amplitude and phase spectrum:



Review Card 9

Name: ___________

1. For a continuous signal $f(t)$, the formula of its Fourier transform is: ____________________________; For a discrete signal $x(n)$, the formula of its Fourier transform is: ______________________________.

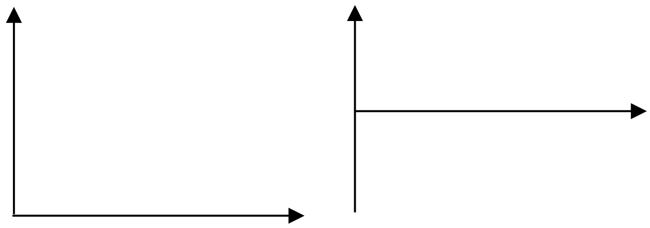
2. If the sampling frequency is 20Hz and a signal $x(n)$ has 10 points, then $x(n)$ can be decomposed into ______(填数目) sinusoid components. The frequencies of these sinusoids are: ____.

3. If the sampling frequency is 10Hz and a signal $x(n)$ has 10 points, then frequency resolution of the spectrum Δf =____. Assuming that the first 6 points of $X(k)$ [the Fourier transform of $x(n)$] are: 4, 3+4i, -2+3i, 4-2i, -1-i, -3.

(A) How many points are missing for $X(k)$? ___________

The missing points are: ____________________________

(B) Draw the amplitude and phase spectrum:



Review Card 9

Name: ___________

1. For a continuous signal $f(t)$, the formula of its Fourier transform is: ____________________________; For a discrete signal $x(n)$, the formula of its Fourier transform is: ______________________________.

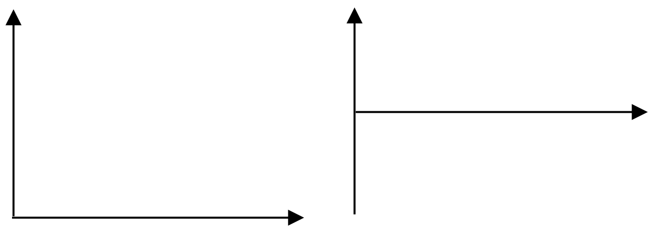
2. If the sampling frequency is 20Hz and a signal $x(n)$ has 10 points, then $x(n)$ can be decomposed into ______(填数目) sinusoid components. The frequencies of these sinusoids are: ____.

3. If the sampling frequency is 10Hz and a signal $x(n)$ has 10 points, then frequency resolution of the spectrum Δf =____. Assuming that the first 6 points of $X(k)$ [the Fourier transform of $x(n)$] are: 4, 3+4i, -2+3i, 4-2i, -1-i, -3.

(A) How many points are missing for $X(k)$? ___________

The missing points are: ____________________________

(B) Draw the amplitude and phase spectrum:



Review Card 9

Name: ___________

1. For a continuous signal $f(t)$, the formula of its Fourier transform is: ____________________________; For a discrete signal $x(n)$, the formula of its Fourier transform is: ______________________________.

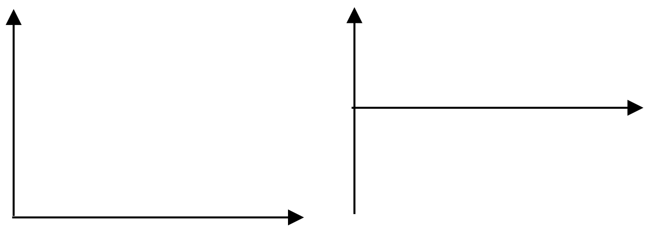
2. If the sampling frequency is 20Hz and a signal $x(n)$ has 10 points, then $x(n)$ can be decomposed into ______(填数目) sinusoid components. The frequencies of these sinusoids are: ____.

3. If the sampling frequency is 10Hz and a signal $x(n)$ has 10 points, then frequency resolution of the spectrum Δf =____. Assuming that the first 6 points of $X(k)$ [the Fourier transform of $x(n)$] are: 4, 3+4i, -2+3i, 4-2i, -1-i, -3.

(A) How many points are missing for $X(k)$? ___________

The missing points are: ____________________________

(B) Draw the amplitude and phase spectrum:



Review Card 10

Name: ___________

1. If the sampling frequency is 1000Hz and the length of x(n) is 500, then frequency resolution △f of the Fourier transform of x(n) is: ________.

Is it possible to separate 80Hz and 82Hz? ________

Is it possible to separate 80Hz and 81Hz? ________

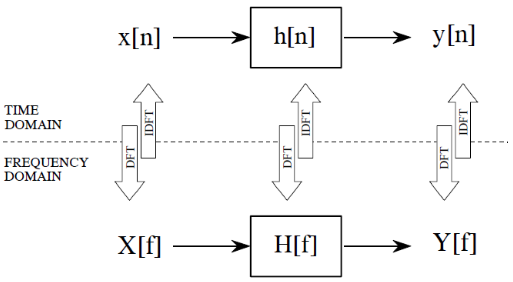
Is it possible to separate 79Hz and 81Hz? ________

Is it possible to separate 1000Hz and 1002Hz? ________

2. For frequencies of 10Hz, 30Hz, 40Hz and 50Hz, what is the fundamental frequency? ______ The third harmonic is ________. The second harmonic of the power line frequency in China is _______

3. If the length of h(n) is 500 and the sampling frequency is 1000Hz, what is the frequency resolution of H[f]? _____

4. For a system below, list two methods to calculate y[n]



Method (1):

Method (2):

If both x[n] and h[n] have 100 points, y[n] will have ___ points and Y[f] will have ____ points. In this case, will the y[n] be the same for the two methods? _______ If no, what can you do to make the y[n] results the same? ________

____

____

Review Card 10

Name: ___________

1. If the sampling frequency is 1000Hz and the length of x(n) is 500, then frequency resolution △f of the Fourier transform of x(n) is: ________.

Is it possible to separate 80Hz and 82Hz? ________

Is it possible to separate 80Hz and 81Hz? ________

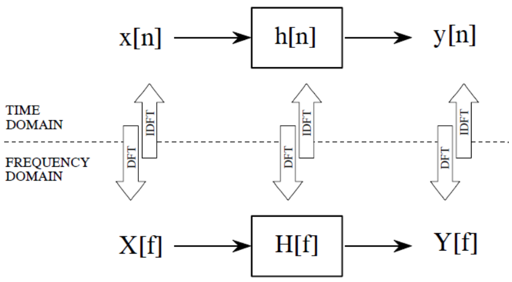
Is it possible to separate 79Hz and 81Hz? ________

Is it possible to separate 1000Hz and 1002Hz? ________

2. For frequencies of 10Hz, 30Hz, 40Hz and 50Hz, what is the fundamental frequency? ______ The third harmonic is ________. The second harmonic of the power line frequency in China is _______

3. If the length of h(n) is 500 and the sampling frequency is 1000Hz, what is the frequency resolution of H[f]? _____

4. For a system below, list two methods to calculate y[n]



Method (1):

Method (2):

If both x[n] and h[n] have 100 points, y[n] will have ___ points and Y[f] will have ____ points. In this case, will the y[n] be the same for the two methods? _______ If no, what can you do to make the y[n] results the same? ________

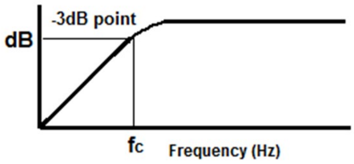
____

____

Review Card 11

Name: ___________

1.If the amplitude spectrum of a system is as flows:



(1) It is a___(high-pass or low-pass) system.

(2) What does -3dB of the y-axis mean? ________________

____

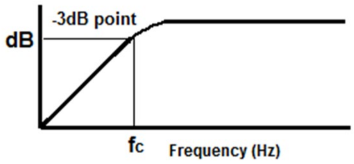
(3) If y-axis is 0dB, it means the amplitude is zero, right and why?____

2. If the sampling frequency is 10Hz and the system always delays the input signal by one point, please draw the phase spectrum of the system:

Review Card 11

Name: ___________

1.If the amplitude spectrum of a system is as flows:



(1) It is a___(high-pass or low-pass) system.

(2) What does -3dB of the y-axis mean? ________________

____

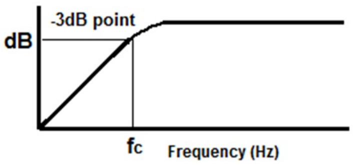
(3) If y-axis is 0dB, it means the amplitude is zero, right and why?____

2. If the sampling frequency is 10Hz and the system always delays the input signal by one point, please draw the phase spectrum of the system:

Review Card 11

Name: ___________

1.If the amplitude spectrum of a system is as flows:



(1) It is a___(high-pass or low-pass) system.

(2) What does -3dB of the y-axis mean? ________________

____

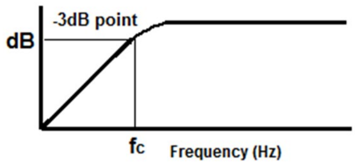
(3) If y-axis is 0dB, it means the amplitude is zero, right and why?____

2. If the sampling frequency is 10Hz and the system always delays the input signal by one point, please draw the phase spectrum of the system:

Review Card 11

Name: ___________

1.If the amplitude spectrum of a system is as flows:



(1) It is a___(high-pass or low-pass) system.

(2) What does -3dB of the y-axis mean? ________________

____

(3) If y-axis is 0dB, it means the amplitude is zero, right and why?____

2. If the sampling frequency is 10Hz and the system always delays the input signal by one point, please draw the phase spectrum of the system:

Review Card 12

Name: ___________

1. Which type of filter is better in performance, analog or digital? ______________

2. There are two ways to evaluate the performance of a digital filter: in time domain and in frequency domain.

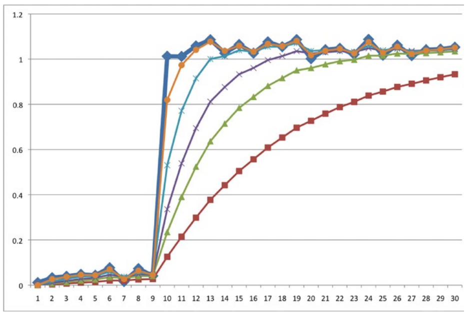
■ Time Domain

(A) What type of system response is used? ___________

(B) What parameters are used? ____________________

____

(C) The responses of several filters are as follows, which filter do you think is best? (Mark the curve)



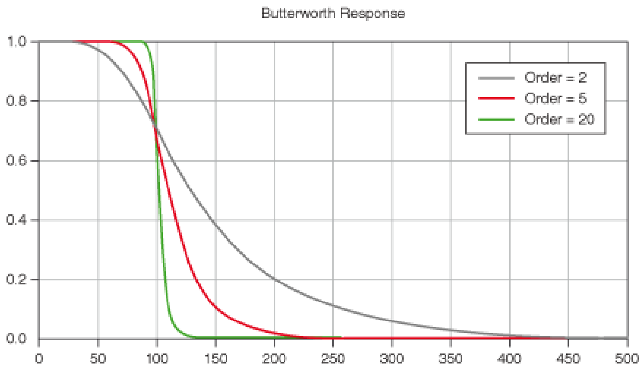
■ Frequency Domain

(A) What type of system response is used? ___________

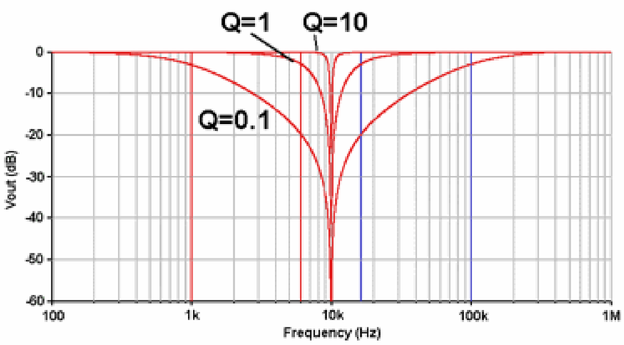
(B) What parameters are used? ____________________

____

(C) The responses of several filters are as follows, which filter do you think is best? (Mark the curve)



What type of filter is above? ______________



What type of filter is above? ______________

Review Card 12

Name: ___________

1. Which type of filter is better in performance, analog or digital? __________

2. There are two ways to evaluate the performance of a digital filter: in time domain and in frequency domain.

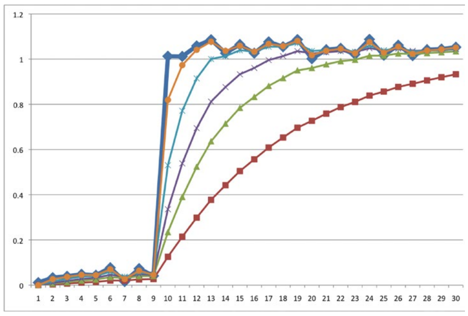
✧ Time Domain

(A) What type of system response is used? ___________

(B) What parameters are used? ____________________

____

(C) The responses of several filters are as follows, which filter do you think is best? (Mark the curve)



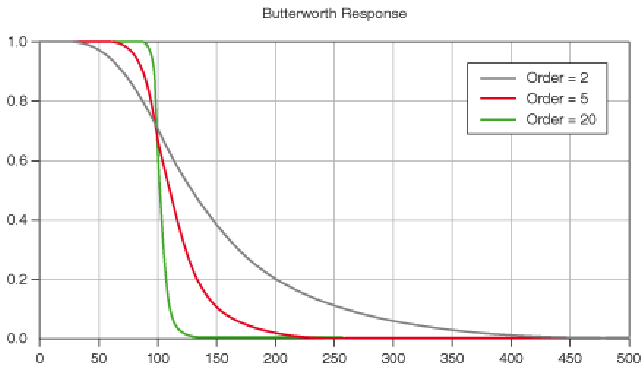
✧ Frequency Domain

(A) What type of system response is used? ___________

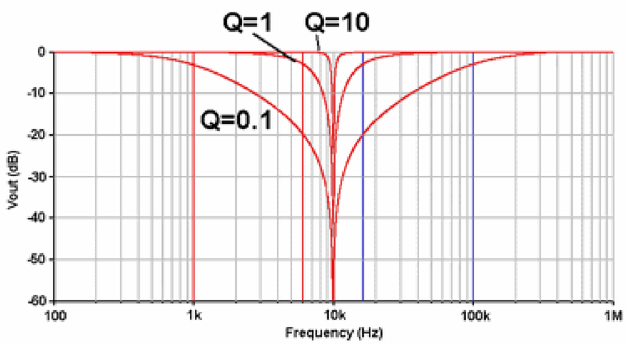
(B) What parameters are used? ____________________

____

(C) The responses of several filters are as follows, which filter do you think is best? (Mark the curve)



What type of filter is above? ______________



What type of filter is above? ______________

Review Card 13 (Matlab)

Name: ___________

1. The easiest way to produce a vector x from 1 to 10 is: __________________________

2. If x=[1 2 3] (行向量) and y=[4 5 6], how to combine x and y to form z=[1 2 3 4 5 6]? ________________

3. If a='I like', b='Matlab', what is the variable type of a and b? __________ How to combine a and b to form c='I like Matlab'? _____________

Review Card 14

Name: ___________

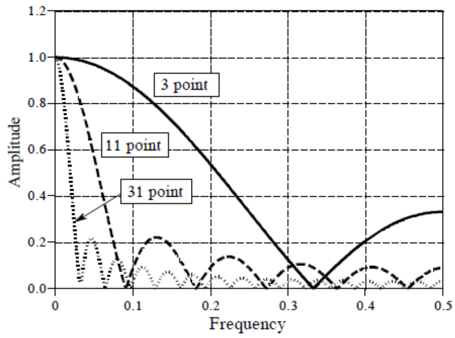
The Moving Average Filter (MAF)

1. For a four-point MAF, draw the impulse response h(n):

2. Is it a high-pass or low-pass filter? ______________

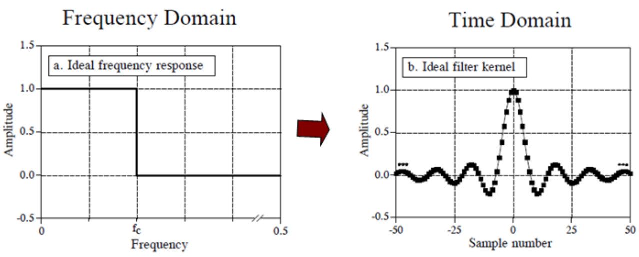
3. The aim we use the MAF is to _________________

4. See figure below of MAF's with different averaging points. The advantage of using more points (such as 31 points) is ____________________, and the disadvantage is: ______________________________.

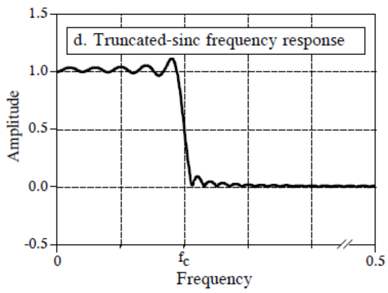


The Windowed-Sinc Filter (WSF)

1. How do we get the filter kernel of WSF from its frequency response (see below)? _________________



2. The actual frequency response is different from its ideal response (see below), why? _________________
____



3. We see that the response above is poor, how to solve the problem? _____________________________

4. What's the two parameters when designing WSF? _
____

Review Card 14

Name: ___________

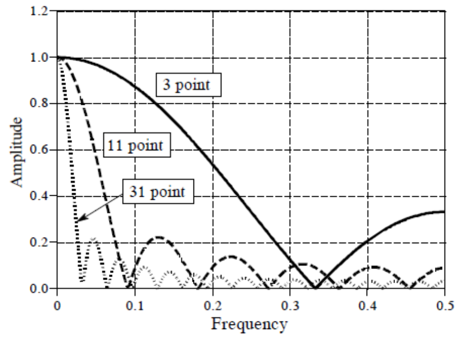
The Moving Average Filter (MAF)

1. For a four-point MAF, draw the impulse response h(n):

2. Is it a high-pass or low-pass filter? ______________

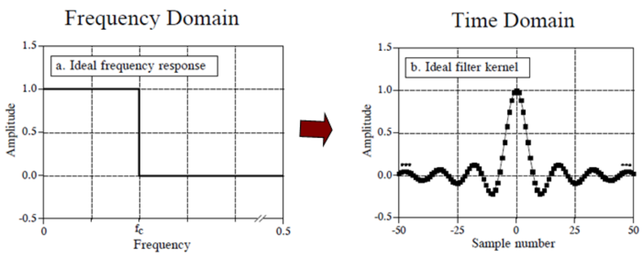
3. The aim we use the MAF is to _________________

4. See figure below of MAF's with different averaging points. The advantage of using more points (such as 31 points) is ____________________, and the disadvantage is: ______________________________.

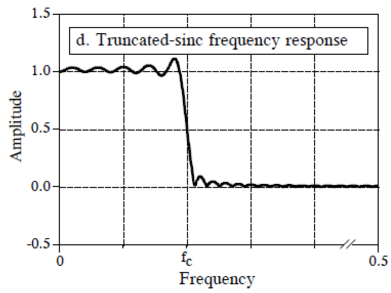


The Windowed-Sinc Filter (WSF)

1. How do we get the filter kernel of WSF from its frequency response (see below)? _________________



2. The actual frequency response is different from its ideal response (see below), why? _________________
____



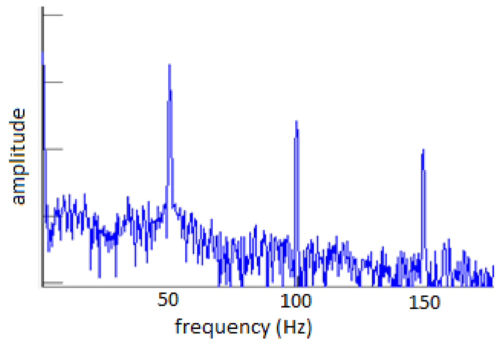
3. We see that the response above is poor, how to solve the problem? _____________________________

4. What's the two parameters when designing WSF? _
____

Review Card 15

Name: ___________

When measuring ECG signals, Xiaoming found that the recorded signal was not as what he expected. After performing a FFT, he found that there were large spikes in the spectrum, which were so large that it was impossible for him to observe the actual ECG signals. Please help him to find a solution to extract the ECG signals from such a noisy recording.



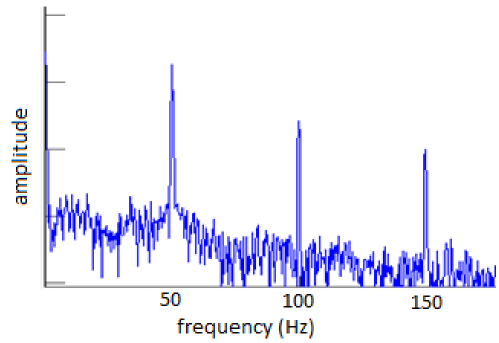
1. Where did the interferences come from? _________
2. Please draw the frequency response of the filter that can remove the interferences.

3. What type of filter is the one you draw above? (Moving average, Windowed-Sinc, or Custom filter)__________
4. Please describe the steps to get the ***h*(*n*)** of this filter?

Review Card 15

Name: ___________

When measuring ECG signals, Xiaoming found that the recorded signal was not as what he expected. After performing a FFT, he found that there were large spikes in the spectrum, which were so large that it was impossible for him to observe the actual ECG signals. Please help him to find a solution to extract the ECG signals from such a noisy recording.



1. Where did the interferences come from? _________
2. Please draw the frequency response of the filter that can remove the interferences.

3. What type of filter is the one you draw above? (Moving average, Windowed-Sinc, or Custom filter)__________
4. Please describe the steps to get the ***h*(*n*)** of this filter?

Review Card 16

Name: ___________

1. Compare FIR and IIR filter:

	FIR	IIR
冲击响应（是/否）有限长度		
负反馈（有/无）		
输出 y(n)与（输入/输出）有关		
需要计算的参数		
计算量		
线性相位（是/否）		

2. Assume that the input and output of a filter satisfies the following equation:

$$2y(n)+4y(n-1)+6y(n-2)=7x(n)+8x(n-2)$$

(1). Please calculate the H(z) of the system:

(2). The recursive coefficients of the filter is:

A=________________________

B=________________________

(3) What Matlab function can be used to plot the frequency response of a filter, given coefficients A and B? ________

Review Card 16

Name: ___________

1. Compare FIR and IIR filter:

	FIR	IIR
冲击响应（是/否）有限长度		
负反馈（有/无）		
输出 y(n)与（输入/输出）有关		
需要计算的参数		
计算量		
线性相位（是/否）		

2. Assume that the input and output of a filter satisfies the following equation:

$$2y(n)+4y(n-1)+6y(n-2)=7x(n)+8x(n-2)$$

(1). Please calculate the H(z) of the system:

(2). The recursive coefficients of the filter is:

A=________________________

B=________________________

(3) What Matlab function can be used to plot the frequency response of a filter, given coefficients A and B? ________

Review Card 16

Name: ___________

1. Compare FIR and IIR filter:

	FIR	IIR
冲击响应（是/否）有限长度		
负反馈（有/无）		
输出 y(n)与（输入/输出）有关		
需要计算的参数		
计算量		
线性相位（是/否）		

2. Assume that the input and output of a filter satisfies the following equation:

$$2y(n)+4y(n-1)+6y(n-2)=7x(n)+8x(n-2)$$

(1). Please calculate the H(z) of the system:

(2). The recursive coefficients of the filter is:

A=________________________

B=________________________

(3) What Matlab function can be used to plot the frequency response of a filter, given coefficients A and B? ________

Review Card 16

Name: ___________

1. Compare FIR and IIR filter:

	FIR	IIR
冲击响应（是/否）有限长度		
负反馈（有/无）		
输出 y(n)与（输入/输出）有关		
需要计算的参数		
计算量		
线性相位（是/否）		

2. Assume that the input and output of a filter satisfies the following equation:

$$2y(n)+4y(n-1)+6y(n-2)=7x(n)+8x(n-2)$$

(1). Please calculate the H(z) of the system:

(2). The recursive coefficients of the filter is:

A=________________________

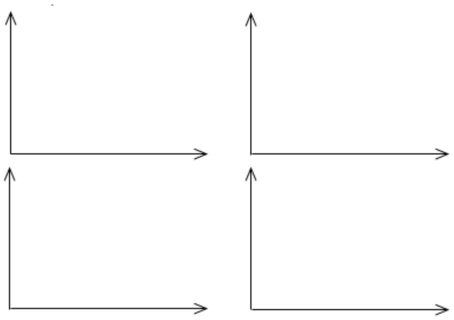
B=________________________

(3) What Matlab function can be used to plot the frequency response of a filter, given coefficients A and B? ________

Review Card 17

Name: ___________

Draw the typical frequency responses of the following low-pass IIR filters: Butterworth, Chebyshev Type I, Checbyshev Type II and Elliptic filters (assuming a cut-off of 0.5)



A. Which has the flattest response? _____________

B. Which has the fastest roll-off? _______________

C. Which has ripples in pass-band? _____________

D. What are the Matlab functions for the four types of filters, respectively? __________, _______, _______, _______

E. After getting the A and B coefficients by using one of the above functions, Xiaming used them to filter input signal *x* immediately, do you think it is OK? ________

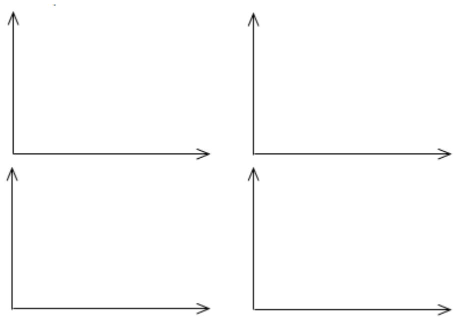
F. If no, what step do you think Xiaoming missed? _____

____

Review Card 17

Name: ___________

Draw the typical frequency responses of the following low-pass IIR filters: Butterworth, Chebyshev Type I, Checbyshev Type II and Elliptic filters (assuming a cut-off of 0.5)



A. Which has the flattest response? _____________

B. Which has the fastest roll-off? _______________

C. Which has ripples in pass-band? _____________

D. What are the Matlab functions for the four types of filters, respectively? __________, _______, _______, _______

E. After getting the A and B coefficients by using one of the above functions, Xiaming used them to filter input signal *x* immediately, do you think it is OK? ________

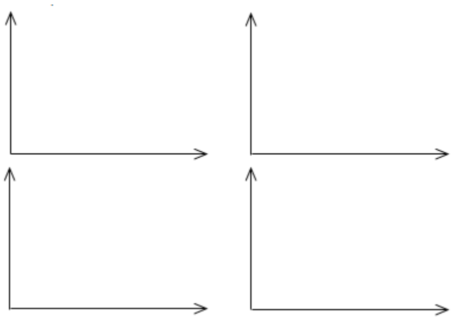
F. If no, what step do you think Xiaoming missed? _____

____

Review Card 17

Name: ___________

Draw the typical frequency responses of the following low-pass IIR filters: Butterworth, Chebyshev Type I, Checbyshev Type II and Elliptic filters (assuming a cut-off of 0.5)



A. Which has the flattest response? _____________

B. Which has the fastest roll-off? _______________

C. Which has ripples in pass-band? _____________

D. What are the Matlab functions for the four types of filters, respectively? __________, _______, _______, _______

E. After getting the A and B coefficients by using one of the above functions, Xiaming used them to filter input signal *x* immediately, do you think it is OK? ________

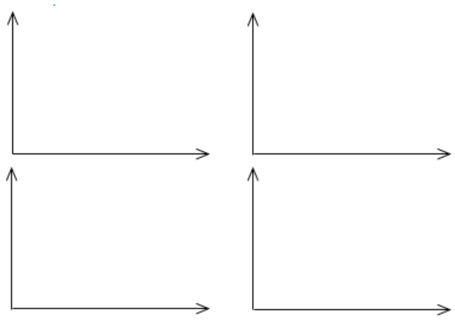
F. If no, what step do you think Xiaoming missed? _____

____

Review Card 17

Name: ___________

Draw the typical frequency responses of the following low-pass IIR filters: Butterworth, Chebyshev Type I, Checbyshev Type II and Elliptic filters (assuming a cut-off of 0.5)



A. Which has the flattest response? _____________

B. Which has the fastest roll-off? _______________

C. Which has ripples in pass-band? _____________

D. What are the Matlab functions for the four types of filters, respectively? __________, _______, _______, _______

E. After getting the A and B coefficients by using one of the above functions, Xiaming used them to filter input signal *x* immediately, do you think it is OK? ________

F. If no, what step do you think Xiaoming missed? _____

____