Information Systems in Healthcare – Michel Kana, PhD - Final Exam

Name: _____

1. **Select the three interdisciplinary fields involved in Health Informatics. (2%)**
   ```
   Modeling and simulation - Computer science - Psychology
   Information science - Signal processing - Health care
   ```

2. **What are the three types of information encountered in health care? (2%)**

3. **Describe the 5 main roles and responsibilities found in a health care system of most countries? (5%)**

4. **Mark the following statements as true or false (14%)**
   - The BIOS is part of the software in a computer, but not of the hardware
   - A relational database organizes data in files instead of tables
   - A telemedicine software is a set of tools for helping health provider in their day-to-day operations in a medical practice
   - The CPU socket of a computer is the place where all calculations take place
   - A network interface controller has a unique MAC address
   - Routers are network devices that control network security and access rules
   - A name server provides translation services between domain names and IP addresses
   - Reporting and population health management can be part of a clinical information system
   - Patient privacy is provided by copying and archiving computer data for the purpose of restoring to the original after a data loss event
   - After launching, the major cost of clinical information systems is generated by IT support and education programs
   - In a clinical decision rule, an intervention is a possible action that the decision support module can take
   - A medical data coder first abstracts medical information from health records, then assigns appropriate codes
   - An artificial neural network is a probabilistic graphical model that represents a set of random variables and their conditional dependencies via a directed acyclic graph
   - Given a text file with patients data (name and age), the following Linux command returns patients younger than 2 years: *awk '$2>2' patients.txt*

5. **Select the five main services provided by an operating system in a computer (2%)**
   ```
   User login - Memory management - Concurrency control - Processor management
   Device management - User interface control - File management
   ```

6. **Briefly describe the role of each layer in the TCP/IP protocol stack (4%)**

7. **Indicate and name the network topologies used in the computer network illustrated below (3%)**
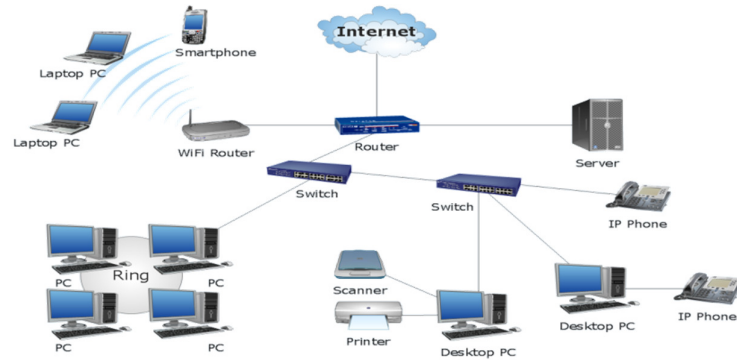
8. **Match the terms with a correct definition (7%)**

a) Electronic health record

b) Clinical decision support system

c) Digital signature

d) Encryption system

e) Computerized provider order entry

f) Primary key

g) Medical practice management software

i. ordering and fulfillment system for medical practitioner instructions for the treatment of patients

ii. set of tools for helping health providers in their day-to-day operations in a medical practice

iii. systematic collection, processing and sharing of health information in electronic form

iv. real-time tool for diagnostic and treatment recommendations

v. demonstrates the authenticity of a digital message or document and its sender

vi. Systems for encoding data in such a way that only authorized parties can read it

vii. column or a group of column that uniquely identify the data in a table row

9. **Briefly describe a RAID level of your choice for data redundancy in computer storage (2%)**

10. What are the three types of clinical decision rules in a decision support system? (3%)

11. Describe 5 computing techniques used by clinical decision support systems, e.g. genetic algorithms (5%)

12. Match each key player with his typical profile within the clinical information system (2%)

1. Registered nurse

2. Medical coder

3. Nurse practitioner

4. Medical transcriptionists

A. registered nurse with an advanced level of education and training

B. works on accurate records management, billing and insurance processing

C. types information from doctors' notes and patient records into official reports

D. graduated from a two to four years state-approved nursing school program

13. Define the following terms (9%)

- Patient encounter:

- Electronic materials management:

- Picture archiving and communications system:

- Computer network communication protocol:

- Medical data coding:

- Network-attached storage:

- ICD-9:

- Database 1st normal form:

- UML:

14. OpenEMR (30%)

Mr./Mrs. XY English is a 52-year-old teacher with chronic diabetes and arthritis (XY is your first name). His/her primary insurance is the National Czech Insurance Company. He/she visits the FBMI Clinic as a patient for the first time and is registered by Dr. XY, a clinician of that clinic (XY is your first name). Mr./Mrs. XY English's father had diabetes as well and his/her aunt has high blood pressure. Mr./Mrs. English is a smoker and drinks alcohol as well as coffee. He is allergic to iodine and immune against rheumatic fever. He/she explains that he/she has pain in the shoulders and tingling in the hands. He/she had a nasty fall while walking two days ago. Dr. XY takes his/her vitals: 90 kg, 170 cm, 145 mmHg systolic blood pressure, 90 mmHg diastolic blood pressure, 77 beats/min pulse. After examination, Dr. XX prescribes the gel Voltaren against pain. Dr. XY associates Mr./Mrs. English's encounter to his/her chronic arthritis. Dr. XY decides to add him/her to a new Alcohol Use Assessment program, that should remind Dr. XY to assess the level of alcohol usage for Mr./Mrs. English on a weekly basis. Finally Dr. XY decides to send him/her to the Radiology Institute of Kladno and he writes an external referral for x-ray and eventually shoulder surgery with a diagnosis of arthritis with muscular inflammation. At the end of the visit, Dr. XY performs medical coding of the encounter and creates a fee sheet for comprehensive visit with code 992.05 for $200. Mr./Mrs. English pays $50, while the remaining $150 are charged to the National Czech Insurance Company.

Perform all steps made by Dr. XY in the **OpenEMR system http://smsos.fbmi.cvut.cz/openemr.**

15. GaiaEHR (7%)

Mr./Mrs. XY English is received in the Radiology Institute of Kladno by Dr. XY who registers him/her by entering demographics, contact, provider, employment and primary insurance. Mr./Mrs. English is added to the arrival log and moved to the triage and later to the physician area. Dr. XY opens a new encounter for first visit following an external referral for x-ray and shoulder surgery with the diagnosis of arthritis with muscular inflammation. Dr. XY enters a shoulder X-Ray order. After examining the results, he later creates an order for shoulder arthroscopy surgery to be performed in the Surgical Clinic of Kladno. Dr. XY finally checkouts the encounter and moves Mr./Mrs. XY English patient to the checkout area.

Perform all steps made by Dr. XY in the GaiaEHR system http://smsos.fbmi.cvut.cz/gaiaehr.

16. OpenMRS (3%)

Mr./Mrs. XY English is received in the Surgical Clinic of Kladno by Dr. XY who registers him/her by entering demographics and current medical problems. Mr./Mrs. English is immediately hospitalized for shoulder arthroscopy surgery.

Perform all steps made by Dr. XY in the OpenMRS system http://smsos.fbmi.cvut.cz:8080/openmrs.