1) Cancer (15 p)

A. Why is cancer linked to old age? *Mutations accumulate*
B. Why is it important to stage cancer? *Prognosis, treatment*
C. What is a carcinogen? *Any substance (or radiation) promoting formation of cancer*
D. What are the two most important routes for the metastatic process? *Hematogeneous, lymphatic*
E. What are unspecific symptoms of cancer that may be present, independent of tumor localization? *Weight loss, fatigue, fever…*
F. In general, what are the three most important treatment options for cancer? *Surgery, chemotherapy, radiation*
G. Prognosis for patients with cancer disease vary depending on many factors. Below are some statements in the context of cancer disease. List for each statement whether you think this is a factor contributing to a good prognosis or a bad prognosis.
    I. The tumor grows very fast *usually bad*
    II. The metastatic tumor is discovered before the primary tumor *bad*
    III. Cancer cells look atypical and it is difficult to define which kind of cells they originate from *bad*
H. How can a vaccine prevent cancer? *Prevent infection with carcinogenic virus like HPV*

2) Inflammation (10 p)

A. Many different agents or situations may trigger an inflammation process. List at least 4
B. What triggers the inflammation process if a person sustains an injury? *Tissue damage/factors released by damaged cells*
C. What is the relation between infection and inflammation? *Infection usually causes inflammation*
D. What are the classical symptoms of inflammation? *Red, warm, swollen, pain, reduced function*
E. What is the "aim" of the inflammation process? *Get rid of damaged tissue and foreign particles, help restore new healthy tissue*
F. Where do viruses replicate? *Inside cells*

3) Gastrointestinal system (15 p)

A. Why is it beneficial that the mucus membrane of the gastrointestinal wall is folded (villi?)? *Increased surface results in more absorption of nutrients*
B. Nutrients are absorbed from the intestines, and drain to a specific organ. Which one? *The liver*
C. What is the exocrine function of the pancreas? *Digestive enzymes, bicarbonate (neutralizing agent)*
D. What are the two important hormones for regulating blood sugar? *Insuline, Glucagone* Which one makes blood sugar go down? How does this hormone make blood sugar go down? *Responding to insulin, tissue cells will take up glucose from the blood circulation and the liver will use glucose to manufacture glykogen*
E. The stomach produces acid to start digestion of food. How is the stomach protected from this acid? *Thick mucus lining*

F. What is the name of the bacteria that can cause gastric/duodenal ulcer? *Helicobacter Pylori*
G. What are dangerous complications of an ulcer? *Bleeding, perforation*
H. What are typical symptoms of gastroenteritis? *Diarrhea, vomiting, abdominal pain*
I. List 2 types of inflammatory bowel disease. *Ulcerative colitis, Mb Crohn*
J. What is the most important cause of hepatitis in developed countries? *Alcohol*

4) Nervous system (10 p)

A. What is the name of the electrically excitable cell in the nervous system? *Neuron*
B. What is a synapse? *Gap between a neuron and another cell, allowing an electrical or chemical signal to be passed on*
C. What is the structure of the nervous system that is not under voluntary control? *Autonomic*
What part of this structure is the system that is activated in stressful situations? *Sympathetic division*
D. List 3 types of muscular activity that is not voluntarily controlled.
E. What do we assess when using the Glasgow Coma Scale? *Level of consciousness*
F. List 3 symptoms associated with Parkinson´s disease *Tremor, rigidity, dementia…*
G. What is myelin, and in which disease is the myelin attacked? *Fatty substance around nerve axons, Multiple sclerosis*

5) Antibiotic resistance (15 p)

A. What is the difference between broad spectrum and narrow spectrum antibiotic? *Narrow spectrum targets specific bacteria vs. many bacteria* Why should we prefer to use narrow spectrum antibiotics? *Only drives resistance for specific bacteria, not many types of bacteria, as broad spectrum*
B. Please write **maximum 1 page** about the problems of antibiotic resistance. You should address the following questions:
Why is antibiotic an increasing problem? Which patient groups are the most at risk? In which areas of medical intervention is antibiotic resistance especially concerning? How can we meet this challenge?
Use and overuse. Traveling. AB used in farms

Patients with compromised immune system… potentially all of us. No more chemotherapy, surgery severely limited.

Use AB only when necessary, and use the right kind of AB (–narrow spectrum)
Education of health care professionals, education of population
Preventive measures to stop infections (hygiene)
Regulative measures –AB only on prescription!
Incentives for industry to develop new AB

6) Evaluating diagnostic tests (20 p)

A pharmaceutical company manufactures a test for a contagious and lethal disease. The condition may be treated with medication, but the medication has serious side effects: Permanent paralysis of both legs. The company has launched a new and improved version of the test.

A test characteristic has been altered leading to an increased number of true negatives and a reduced number of false positives.

A. What are *true negatives* and *false positives* in this context? *People who are not diseased (healthy) -the true negatives have a negative test, and false positives are healthy, but with a positive test*

B. Which test characteristic has been altered? *Specificity*

C. How does the improved test characteristic change how you interpret a positive test result (the positive predictive value), as compared to the old test? *There are fewer false positives relative to the true positives, so the positive predictive value would increase*

D. Why is it important to minimize false positives in this context? *Serious side effects of the medication*

E. Unfortunately, this terrible disease spreads fast, and is very prevalent in the Middle East. Fortunately, the disease is not prevalent in Norway. In fact, there is only a hand full of known cases. What would you think of a positive test result for this condition in Norway, as compared to the Middle East? *More likely to be a false positive. The positive predictive value in Norway is less than in the Middle East*

F. Explain the terms accurate and precise when we are talking about measurement properties.
Accuracy: Closeness of measurement to a specific value, description of systematic error
Precise: Closeness of measurement to each other

G. What is the ideal sensitivity of a test? Explain why. *100%. You would like all diseased patients to be correctly identified.*

7) Prevention (15 p)

A. What do we mean by primary prevention vs secondary prevention? *Primary prevention is before disease occurs, secondary is about detecting asymptomatic disease –typically cancer screening*

B. What is the strongest scientific evidence of treatment, which should be the basis for decisions of implementing a treatment or a preventive measure? *RCTs subs meta analysis, studies including hard end-points*

C. Explain the length-time bias in screening programs. *Screening more likely to detect less aggressive disease*

D. Explain the lead-time bias in screening programs*. Earlier diagnosis, but no change in point of death*