Sample Problems from GEO 1001 IFAT Exercises

1) If rock had been as good a conductor of heat as metal, then by now (after 4.5 billion years) all of the following would be true, **EXCEPT**:
   a) The Earth would now be a frozen world.
   b) The Earth would no longer have any active volcanic activity.
   c) The Earth would have very few, if any, earthquakes.
   d) The Earth would no longer have an active magnetic field.
   e) The Earth would no longer have any active plate tectonic processes.

2) If the Earth's lower mantle had the same physical state as its outer core then which of the following would occur?
   a) Plate tectonic activity would decrease as the plates could no longer move over a physically weaker layer.
   b) Plate tectonic activity would increase in response to faster heat flow from the Earth's interior.
   c) The Earth would have a much stronger magnetic field.
   d) The Earth would have a much warmer climate then it does at present.
   e) The Earth would have a much weaker magnetic field.

3) If the laws of physics could somehow be changed so that rock became more brittle as pressure increased, then which of the following would be true?
   a) Earthquakes would only be able to occur within the Earth's crust.
   b) Earthquakes would only be able to occur within the Earth's lithosphere.
   c) There would be fewer earthquakes occurring than there are now.
   d) There would be less faulting of rocks occurring than there is now.
   e) There would be less folding of rocks occurring than there is now.

4) If continental crust was denser than oceanic crust then all of the following would occur, **EXCEPT:**
   a) There would be no significant difference in how plate tectonics occurred, only in the rate at which they occurred.
   b) A plate segment topped by continental crust would be more likely to subduct than one topped by oceanic crust.
   c) Oceans would be located over areas of continental crust rather than over areas of oceanic crust.
   d) The Earth's oceanic crust would tend to be older than its continental crust.
   e) None of the above (Use this choice if all of the above are true statements.)

5) And finally one from the Old Testament: "And his feet shall stand in that day upon the Mount of Olives… and the Mount of Olives shall be cleaved in half, on the east and on the west, creating a great valley, and half of the mountain shall be moved to the north and half to the south. … in the days of Ozias, King of Juda." Based just on this written description, which type of fault most likely runs through this area? *(Hint: Realize that, in the writing style of the time, the passage is saying the east side moved north and the west side south.)*
   a) A right-lateral strike-slip fault.
   b) A left-lateral strike-slip fault.
   c) A normal fault.
   d) A reverse fault.
   e) A thrust fault.

6) If we were to change the laws of physics and chemistry, so that no covalent bonds existed and only ionic bonds formed, then all of the following would be **true**, **EXCEPT**:
   a) In general most rocks would be more easily altered than they are at present.
   b) Most minerals would tend to be less resistant to weathering than they are at present.
   c) More andesitic and rhyolitic magma would form, as water would have an even greater affect on mineral melting points.
   d) More basaltic magma would form, as water would be even more effective at generating magmas at spreading zones.
   e) Overall, there would be an increase in volcanic activity on Earth.

7) One of the earliest recorded attempts to control a volcanic eruption occurred when the men of one village, using hide shields as protection, successfully broke through the chilled margin of a lava flow to redirect the lava flow through a neighboring community rather than their own. If all of this volcanic system's magma was similar to this eruption, how did the magma most likely originate?
   a) Water was introduced into hot mantle rock, causing some of the rock to melt.
   b) As rock masses ground past one another along faults, friction caused some of the rock to melt.
   c) As rock masses rose towards the Earth's surface, the pressure decreased causing some of the rock to melt.
   d) As rock masses sank into the Earth, the pressure rose high enough to cause some of the rock to melt.
   e) As a subducting plate sank into the Earth, the temperature rose high enough to melt some of the rock.

8) What would be the effect on the world's climate system if there were no oceans on Earth?
   a) The climate would be cooler overall, with a greater temperature difference between equator and poles.
   b) The climate would be cooler overall, with less temperature difference between equator and poles.
   c) The climate would be warmer overall, with a greater temperature difference between equator and poles.
   d) The climate would be warmer overall, with less temperature difference between equator and poles.
   e) The global average would remain the same but the equator would be cooler and the poles warmer than they are now.

9) If the Moon was as large as the Earth, what would be the effect on the Earth's tides?
   a) With equal masses, the tide-causing forces would balance one another out and no tidal bulges would occur.
   b) The tidal bulge facing the Moon would be larger, but the one on the opposite side of the Earth would be smaller.
   c) The tidal bulge facing the Moon would be smaller, but the one on the opposite side of the Earth would be larger.
   d) There would be no significant change in the size of either tidal bulge.
   e) Tidal bulges on both sides of the Earth would be larger than they are now.

10) Although we did not cover this in class, based on what you know of river systems which of the following is most likely to be true?
   a) Although sea level changes greatly affect the marine fossil record, they do not significantly affect land fossil records.
   b) Lower sea levels during the Triassic greatly increased land area, leading to a better fossil record of land life.
   c) Lower sea levels during the Triassic led to more river erosion and increased sediment leading to a better record of land life.
   d) Higher sea levels during the Cretaceous led to more deposition by river systems and a better fossil record of land life.
   e) Higher sea levels during the Cretaceous reduced river slopes, leading to less active river systems and a worse record of land life