Answers III.3 Fungi.

1. (2 pts) How do the cell walls of fungi differ from those of plants?

   Chitin (fungi) vs. cellulose (plants).

2. (2 pts) The thread-like structure (large surface area to volume ratio) of hyphae maximizes nutrient absorption. What structures in the human gut perform the same function?

   Microvilli.

3. (2 pts) Give other (at least two) examples from vertebrate anatomy in which increased surface area to volume ratio facilitates the exchange of materials.

   Alveoli of the lungs; gill filaments; capillaries, renal tubules, etc.
4. (3 pts) What are receptor tyrosine kinases (RTKs)?

Receptors are proteins that penetrate cell membranes. When activated by an extracellular signal, they induce changes within the cell.

Kinases transfer phosphate groups from high-energy compounds to target molecules, a process called phosphorylation. Kinases that phosphorylate tyrosine are called tyrosine kinases.

An RTK is thus a receptor that phosphorylates a tyrosine residue which, in this case, is part of the RTK itself. As shown in the accompanying figure, this triggers a signal transduction pathway via phosphorylation of a G protein called Ras. See text, p. 213 for further details.
5. (2 pts) The large surface area to volume ratio of hyphae increases the absorption of water and nutrients from the soil. What’s a potential down side?

Desiccation; loss of nutrients to nutrient poor soils.

6. (2 pts) Name a common fungal disease in arid environments to which all of us have been exposed.

Valley fever.

7. (2 pts) a. What are yeasts good for – besides rising dough? b. Name two fungal plant diseases that have resulted in the decimation / near extinction of important North American trees.

8. (6 pts) Why should *Pilobolus* discharge its spores away from the dung heap on which it’s growing?

The nutritive value of the dung on which *Pilobolus* grows is continually being depleted – by *Pilobolus* itself, by other fungi, dung beetles, etc. The best strategy would seem to be to get one’s offspring to a fresh pile. By “shooting” spores onto nearby grass, *Pilobolus* increases chance they will be eaten by an herbivore. Spores then pass through the animal’s gut and germinate once the manure has been deposited.

9. (6 pts) Approximately how many fungal spores do each of us inhale per minute?

60-100.

With each breath, the average person inhales about half a liter of air. One liter = $10^{-3}$ cubic meters. So each breath is $5 \times 10^{-4}$ m$^3$. If each cubic meter of contains $10^4$ spores, each of us inhales 5 of them every time we breathe. Normal adult respiration rate = 12-20 breaths/min. So we inhale 60-100 spores every minute.