If gas hydrates are present in the polar layered deposits of Mars, could the Mars Polar Lander have induced an explosion of these gas hydrates during landing? From his days as a mathematics graduate student, a reader recalls his solution for how he and his roommates could split the rent, where "each person gets a room at less rent than he or she had determined themselves is fair." Several examples from veterinary medicine of adenovirus infections that can become severe and sometimes fatal are described (human adenovirus is often used for gene therapy trials, such as the one in which Jesse Gelsinger participated). Archaeological evidence for the first South Americans is discussed. The commercial hunting of wildlife and its implications for wildlife conservation policies are considered. And results from a 1993 report in *Science* are retracted.

What Went Wrong with the Mars Landing?

Speculation regarding the failure of the Mars Polar Lander mission has not included the possibility of a fragile and thermally unstable soil at the landing site [see related News of the Week articles "Yet another loss to the martian gremlin" by Richard Kerr (10 Dec., p. 2051) and "Changes to missions could delay science" by Andrew Lawler and Richard Kerr (17 Dec., p. 2248)]. Gas hydrates are found on Earth in permafrost and oceanic sediments (*1*). Similar gas hydrates, such as solid CO_2-H_2O clathrates, have been proposed to occur in the martian polar layered deposits (*2, 3*). The interaction between the components in these CO_2 hydrates is by van der Waals interactions (*4*), and low temperature stabilizes these compounds.

If CO_2 hydrates are present at the target site, the hydrates will have persisted after sublimation of the ice because they are significantly more stable than ice. Observations from the Mars Global Surveyor several weeks before the landing indicated the presence of ice at the landing area. The disturbance and heat induced by the lander at the last phase of the descent could cause rapid dissociation of such gas hydrates. If the quantity of gas hydrates in the soil at the landing site were sufficient, gas expansion could have been catastrophic and resulted in the loss of the Polar Lander. Similarly, the two probes of the mission would have penetrated the martian surface to depths far in excess of those anticipated, thus precluding radio contact.

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Splitting the Rent

The Random Samples item "Splitting the rent, keeping the peace" (7 Jan., p. 37) reminded me of when I and three roommates, all mathematics graduate students, shared an apartment in the late 1950s. We had the same problem as described in the Random Samples item, and we all agreed to a solution I proposed. The idea is that each roommate divides the total rent *R* among the available rooms, assigning to each room what he or she would consider a fair rent for that room. The person who assigns the highest rent to a room has the rights to that room at that rent, less an equal share of the total rent excess. If anyone has the rights to more than one room, he or she choses one, and the rights to the other is given to the person who assigned the next higher rent. Ties are decided randomly. When everyone has chosen a room, the total *T* of the assigned rents for all the rooms exceeds the apartment rent *R*. (It can be proved that this total must be equal to or greater than *R*.) Therefore, each person gets a room at less rent than he or she had determined themselves is fair, the reduction equaling $(T - R)/n$, where *n* is the number of roommates. Whereas the Random Samples item mentions that the iterative solution described there has the flaw that it fails to arrive at a solution if any roommate would not accept an undesirable room even for zero rent, my solution works even for this case by allowing the portion an individual assigns to an undesirable room to be zero or negative. The only constraint is that the total of the rents an individual assigns to all rooms equals *R*. It would be possible for someone to be paid from the rents of the other roommates to accept an undesirable room, a situation that is perfectly consistent with the problem statement.

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Veterinary Perspective on Gene Therapy with Adenoviruses

Attempts to explain the death of 18-year-old Jesse Gelsinger after the administration of a very high dose (3.8×10^{13} virus particles) of a recombinant adenovirus designed to correct his defective ornithine-transcarbamylase gene have not fully elucidated the components that may have contributed to his rapid death, according to Eliot Marshall's News of the Week article "Gene therapy death prompts review of adenovirus vector" (17 Dec., p. 2244). In human medicine, the conventional view of adenoviruses is that they cause only mild upper respiratory or enteric illnesses; this feature, among others, has made them a favorite candidate vector for gene therapy.

In veterinary medicine, there are at least three examples of adenovirus infections that indicate that the virus may become viremic and cause severe generalized infections with fatal outcomes (*1*). Canine adenovirus 1 can cause peracute death characterized by massive liver necrosis, a syndrome commonly called infectious canine hepatitis. This syndrome is now relatively rare because of widespread vaccination of dogs. The canine virus, similar to human adenoviruses, also causes milder disease, including upper respiratory tract disease. Even before the advent of vaccination, the peracute deaths from hepatitis were rare and sporadic, suggesting that host factors, including genetic defects, may be involved in the syndrome. Some avian adenovirus strains are also known to cause generalized infections in birds, for which in one instance the disease has been called inclusion body hepatitis because of the intranuclear inclusion bodies formed from the replication complexes of the adenovirus in the nuclei of hepatocytes. In a third example, certain Arabian foals that are born with a genetic defect termed primary severe combined immunodeficiency, die by about 3 months of age; an invariable finding in these foals is an inexorably progressive, generalized equine adenovirus 1 infection [for review, see (*2*)]. At postmortem of these foals, adenovirus inclusion bodies and tissue destruction can be found in a wide range of tissues, not dissimilar from that reported in the case of Jesse Gelsinger. In conventional foals (that is,