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2.

f = .5   f = 1   f = 2   f = 3   f = -2

4.

f = -3   f = 0   f = 2   f = 6

8.

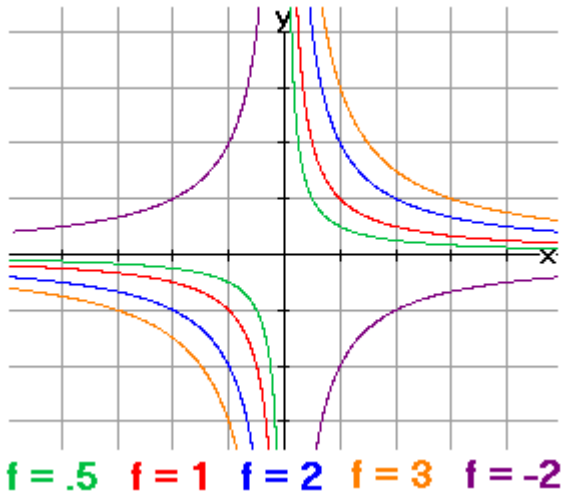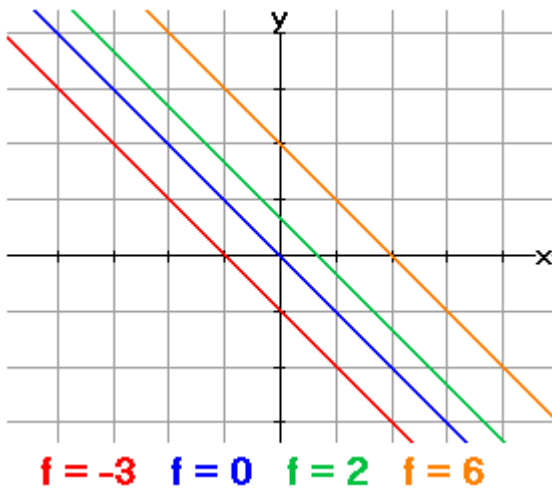f = -2   f = 0   f = 1   f = 3
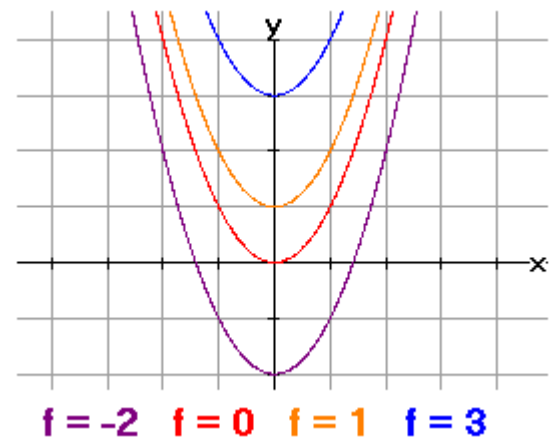
23. (a) (III): Because negative z-values are possible in (a) but not in (d) or (e), (III) must be (a) (though

the horizontal cross sections of (a) do not really appear circular to me).

(b) (I): Each horizontal cross section of (b) is a single line (parallel to the x-axis).

(c) (V): Most horizontal cross sections of (c) are two lines (parallel to the y-axis); the one at the top of the arch is only one line, apparently at $z = 6$, and higher horizontal planes miss the surface.

(d) (II): Horizontal planes at larger values of z give smaller circular cross sections, so (II) represents (d) rather than (e).

(e) (IV): By elimination.

29. If we replace L and K in the general Cobb-Douglas production function with $2L$ and $2K$ respectively, the value of P changes from $cL^\alpha K^\beta$ to $2^{\alpha+\beta}cL^\alpha K^\beta$; so the question is how the latter value is related to twice the former. But that is just a question of whether $2^{\alpha+\beta}$ is greater than, equal to, or less than 2, or in other words, whether $\alpha + \beta$ is greater than, equal to, or less than 1:

   if $\alpha + \beta > 1$, there are increasing returns to scale;

   if $\alpha + \beta = 1$, there are constant returns to scale;

   if $\alpha + \beta < 1$, there are decreasing returns to scale.

30. (a) At the 15-foot mark, where at times it suddenly gets cold.

   (b) At 10 a.m. and 4 p.m. (16 hours), when the temperature drops. It probably remains open until about noon the first time and about 6 p.m. the second time.

   (c) Midnight to 2 a.m, 10 a.m. to 1 p.m., and 4 p.m. to about 9:30, when the left end of the wall warms to $80°$. (The small isotherm on the left between 10 p.m and 11 p.m. isn't labeled, so it may be either 80 or 70.)

   (f) The temperature outside is apparently lower at 5 p.m. Perhaps the window is on the east side of the house, so that it is colder in the afternoon than in the morning.

   (g) $70°$, because when most of the wall crosses that temperature, the heater turns on or off.

   (h) We are told it is 2 ft from the window, so the question is whether it is to the right or left of the window. That is not easy to see, but it seems to be to the left, on the heater side, rather than on the right: When that point warms $70°$, the heater turns off. That's hard to see the first two times the heater is on, because the $70°$ contour is almost horizontal; but the third time is clearer.