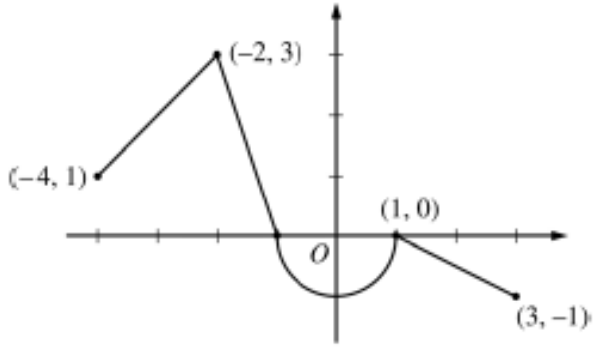
For $t \geq 0$, a particle is moving along a curve so that its position at time t is (x(t), y(t)). At time t = 2, the particle is at position (1, 5). It is known that $\frac{dy}{dx} = \frac{\sqrt{t+2}}{e^t}$ and $\frac{dy}{dt} = \sin^2 t$.

a. Is the horizontal movement of the particle to the left or to the right at time t = 2? Explain your answer. Find the slope of the path of the article at time t = 2.

b. Find the x-coordinate of the particle's position at time t = 4.

c. Find the speed of the particle at time t = 4. Find the acceleration vector of the particle at time t = 4.

d. Find the distance traveled by the particle from time t = 2 to t = 4.



Graph of f

Let f be the continuous function defined on [-4, 3] whose graph, consisting of three line segments and a semicircle centered at the origin, is given above. Let g be the function given by $g(x) = \int_1^x f(t)\,dt$.

a. Find the values of g(2) and g(-2).
b. For each of g'(-3) and g"(-3), find the value or state that it does not exist.
c. Find the x-coordinate of each point at which the graph of g has a horizontal tangent line. For each of these points, determine whether g has a relative minimum, relative maximum, or neither a minimum nor a maximum at the point. Justify your answers.
d. For -4 < x < 3, find all values of x for which the graph of g has a point of inflection. Explain your reasoning.