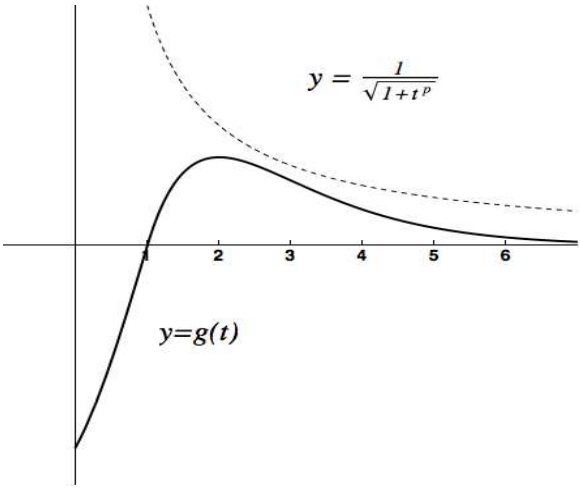
2. [9 points] Consider the function $g(t)$, whose graph is shown below, which satisfies

$$0 < g(t) \leq \frac{1}{\sqrt{1+t^p}} \qquad \text{for } t > 1.$$



a. [4 points] Find a formula for the antiderivative $f(t)$ of $g(t)$ satisfying $f(1) = 2$.

Solution: $f(t) = 2 + \int_1^t g(x)\,dx$

b. [2 points] For which values of $t \geq 0$ is $f(t)$ increasing?

Solution: $1 \leq t \leq \infty$

c. [2 points] For which values of $t \geq 0$ is $f(t)$ concave up?

Solution: $0 \leq t \leq 2$

d. [1 point] For which values of p is the limit $\lim_{t\to\infty} f(t)$ guaranteed to exist?

Solution: $p > 2$