Example: Exponential Potential

\[ U(x) = -5\exp(-x) \text{ for } x > 0 \]
\[ U(x) = 0 \text{ for } x < 0 \]

\[ U(x) := -5\text{Heaviside}(x)\exp(-x); \]
\[ \text{plot}(U(x), x = -2..4); \]

Now choose an energy and the associated starting conditions at \( x = -1 \):

\[ E := -0.0325; \]
\[ \text{icond} := y(-1) = 1, D(y)(-1) = \sqrt{-E}; \]

and solve out to large \( x \), then view:

\[ \text{deq} := \text{diff}(y(x), x^2) + (E - U(x))y(x) = 0; \]
\[ f := \text{dsolve}([\text{deq}, \text{icond}], \text{numeric}, \text{range} = 0..1.0, \text{output} = \text{listprocedure}); \]
\[ \text{ftoplot} := \text{eval}(y(x), f); \]
\[ \text{plot}(\text{ftoplot}(x), x = -10..20); \]

\[ \text{restart}; \]
\[ \text{}; \]