In the last lecture, we saw a potential based on distance to a fixed point

\[ \phi(x) = c \| x - x_0 \| \]

which models gravity in everyday life.

Notice:
- can use this to shape "flow" of particles.
- this potential is attractive
- repulsive:
  \[ \phi_r = -c \| x - x_0 \| \]
Those pix should look familiar.

too

which superficial, those can sketch great fields.
lies can build attractors / repellors of more complex shape

Q: complete distance?

A: Should not be expensive.

line segments are good.

points

line segment

\[ \phi(x) = c \cdot g(\text{min dist } x \to l) \]

min dist \( x \to l \)?

line \( p_0 + tv_0 \)

point \( x \)

closest point is \( q \) (unknown)
\[ \begin{align*}
t_g &< 1 \iff t_g = 1 \\
\text{else} \quad t_g > 0 &\Rightarrow t_g = 0 \\
4 \leq t_g \leq 17 &\Rightarrow t_g = 0
\end{align*} \]

If \( 4 \leq t_g \leq 17 \) then \( t_g = 0 \).

\[ \begin{align*}
\frac{(v_0 \cdot v_0)}{(v_0 \cdot v_0 - p \cdot v_0)} &= t_g \\
so \quad x \cdot v_0 &= (p + t_g \cdot v_0) \cdot v_0 \\
so \quad x \cdot v_0 &= 9.8 \cdot v_0 \\
so \quad (x-4) \cdot T \cdot v_0 &= (x-4) \cdot v_0
\end{align*} \]