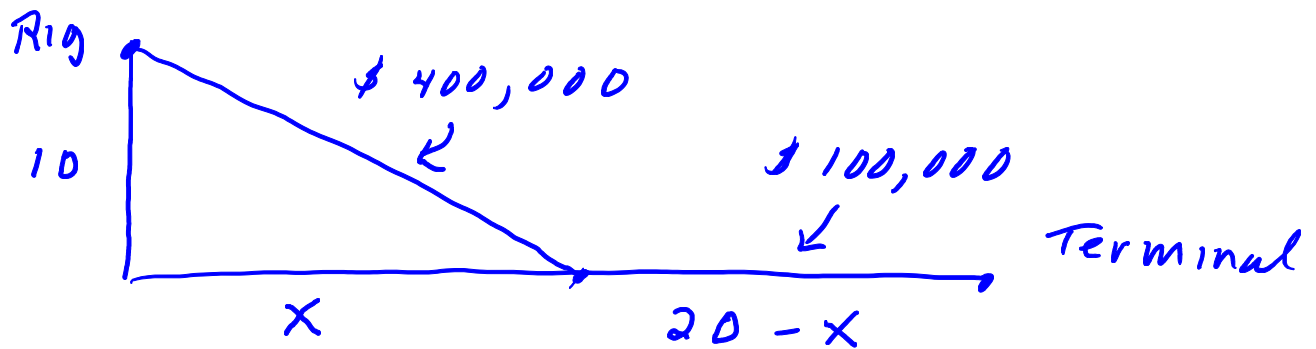
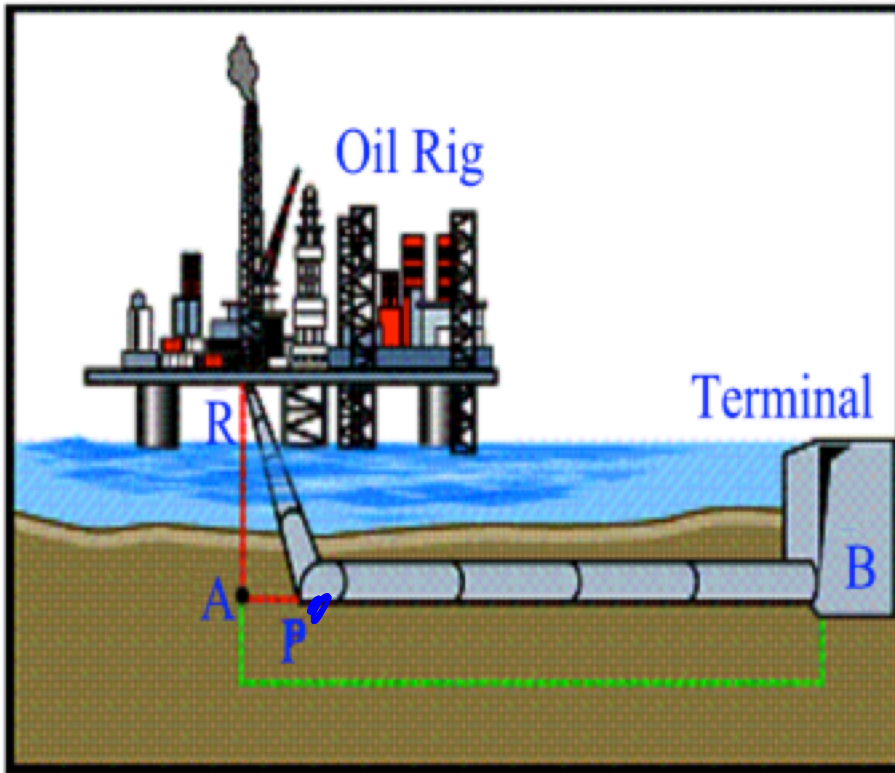


An environmental company wishes to run a pipeline from a pumping platform located 10 miles offshore to a terminal 20 miles down the coast. It costs \$400,000 per mile to lay the pipeline underwater and \$100,000 per mile to lay the pipeline over land. Determine how many miles from the terminal the two pipes should meet so that the total cost is minimized.



$$C(x) = \sqrt{x^2 + 100} \cdot (400) + (20 - x)100$$

Determine  $x$  so that  $C(x)$  is a min.

$$C'(x) = \frac{400}{2\sqrt{x^2+100}} \cdot 2x - 100 = 0$$

$$400x = 100\sqrt{x^2+100}$$

$$4x = \sqrt{x^2+100}$$

$$16x^2 = x^2+100$$

$$15x^2 = 100, \quad x^2 = \frac{100}{15}$$

$$x = \sqrt{\frac{20}{3}} \text{ miles}$$

$$x = 2.542 \quad x \approx 2.6 \text{ miles}$$

$$20 - 2.6 = 17.4 \text{ miles}$$

$$C(2.6) = \text{total cost.}$$