

Tyrel Martensen
 Math 1210
 Gas Pipeline Signature project

- \$300,000 / mile
- (+ 200,000 / mile (Private ground))
- (+ 500,000 (mountain rate))
- + 100,000 (study)
- + 150,000 (delay)

$C(d)$ = cost per distance

a) $C(d) = 300,000d + 500,000 + 100,000 + 150,000$

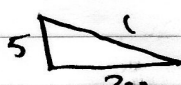
$d = (21-1) + 5 = 25$

$C(25) = 300,000(25) + 500,000 + 100,000 + 150,000 = \$8,250,000$

$d = 1 + 5 + 21 = 27$

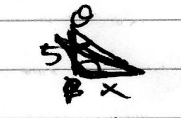
$C(d) = 300,000d$

$C(27) = \$8,100,000$

b)  $\sqrt{25+400} = c = \sqrt{425}$

$C(d) = 300,000d + 200,000d$
 $= 500,000d$

$C(\sqrt{425}) = 500,000(\sqrt{425}) = 10,307,764.06$

c)  $\sqrt{5^2+x^2} = \sqrt{25+x^2}$

$C(d) = 500,000(\sqrt{25+d^2}) + 300,000(20-d)$

$d = 3.75$

$500,000(25+d^2)^{1/2} + 300,000(20-d)$

$2d \cdot 250,000(25+d^2)^{-1/2} + 300,000(-1)$

$500,000d(25+d^2)^{-1/2} - 300,000 = 0$

$500,000d(25+d^2)^{-1/2} = 300,000$

$\frac{500,000d}{\sqrt{25+d^2}} = 300,000 \cdot \frac{500,000d}{300,000} = (25+d^2)^{1/2}$

$\frac{5d}{3} = \sqrt{25+d^2} \quad 5d = 3\sqrt{25+d^2} \quad 25d^2 = 9(25+d^2)$

$16d^2 = 225$
 $d = \sqrt{\frac{225}{16}}$

$$\sqrt{5^2 + 3.75^2} = 6.25$$

$$\arctan \theta \frac{6.25}{5} = 51.34019175^\circ$$

$$C(3.75) = 500,000 (25 + 3.75^2)^{1/2} + 300,000 (20 - 3.75) \approx 51.34^\circ$$
$$= 8,000,000 \cdot 6.25 + 16.25$$

Cutting across private ground @ a 51.34 degree angle will be the best option for the company. Saving them 250,000 over going through the mountain & 100,000 over going around. It would also save \$2,307,764.06 from the straight shot approach.