Source:

1 | cube root

1.1 | approximation

$$(1+x)^{\frac{1}{3}} \to \frac{1}{3}(1+x)^{\frac{-2}{3}}$$

at $x = 0$ is

$$\frac{1}{3}(1+0)^{\cdots} = \frac{1}{3}$$

so the linear approximation is

$$y = m(x-0) + f(0) = \frac{1}{3}x + 1$$

1.2 | estimations

value	estimate
0.05	1.016666
-0.25	0.916666

These will be overestimates because the graph is concave down in this reigon.

2 | sin(x)

2.1 | approximation

$$y = \left(\frac{d}{dx}\Big|_0 \sin x\right)(x-0) + \sin 0 = x$$