Source:

1 | cube root

1.1 | approximation

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

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

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

2.2 | remainder skipped temporarily

3 | unknown function (only some points known

3.1 | approximation

$$y = \frac{d}{dx}f(x)\Big|_c (x-c) + f(c) \text{ where } c = 1$$