

Name : _____

Score : _____

Teacher : _____

Date : _____

Linear Approximations

Use linear approximation to find estimates of each value.

1) $\cos(182^\circ)$

2) 2.01^2

3) $\cos(33^\circ)$

4) $2^{4.03}$

5) $6^{2.99}$

6) $5^{3.99}$

7) 7.02^4

8) $\sin(121^\circ)$

9) $\cos(43^\circ)$

10) 3.97^3



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Linear Approximations

Use linear approximation to find estimates of each value.

1) $\cos(182^\circ)$

Use $f(x) = \cos(x)$, $x_0 = \pi$, and $\Delta x = \frac{\pi}{90}$

$$\cos(182^\circ) \approx -1$$

2) 2.01^2

Use $f(x) = x^2$, $x_0 = 2$, and $\Delta x = \frac{1}{100}$

$$2.01^2 \approx \frac{101}{25}$$

3) $\cos(33^\circ)$

Use $f(x) = \cos(x)$, $x_0 = \frac{\pi}{6}$, and $\Delta x = \frac{\pi}{60}$

$$\cos(33^\circ) \approx \frac{\sqrt{3}}{2} - \frac{\pi}{120}$$

4) $2^{4.03}$

Use $f(x) = 2^x$, $x_0 = 4$, and $\Delta x = \frac{3}{100}$

$$2^{4.03} \approx 16 + \frac{12}{25} \ln(2)$$

5) $6^{2.99}$

Use $f(x) = 6^x$, $x_0 = 3$, and $\Delta x = \frac{-1}{100}$

$$6^{2.99} \approx 216 - \frac{54}{25} \ln(6)$$

6) $5^{3.99}$

Use $f(x) = 5^x$, $x_0 = 4$, and $\Delta x = \frac{-1}{100}$

$$5^{3.99} \approx 625 - \frac{25}{4} \ln(5)$$

7) 7.02^4

Use $f(x) = x^4$, $x_0 = 7$, and $\Delta x = \frac{2}{100}$

$$7.02^4 \approx \frac{60711}{25}$$

8) $\sin(121^\circ)$

Use $f(x) = \sin(x)$, $x_0 = \frac{2\pi}{3}$, and $\Delta x = \frac{\pi}{180}$

$$\sin(121^\circ) \approx \frac{\sqrt{3}}{2} - \frac{\pi}{360}$$

9) $\cos(43^\circ)$

Use $f(x) = \cos(x)$, $x_0 = \frac{\pi}{4}$, and $\Delta x = \frac{-\pi}{90}$

$$\cos(43^\circ) \approx \frac{\sqrt{2}}{2} + \frac{\sqrt{2}\pi}{180}$$

10) 3.97^3

Use $f(x) = x^3$, $x_0 = 4$, and $\Delta x = \frac{-3}{100}$

$$3.97^3 \approx \frac{1564}{25}$$

