DAY 30 §2.2 Derivative at a Point

pp. 87-89 # 6-9, # 22, 23, 31

⑥ $f(x) = x^3 + 4x$

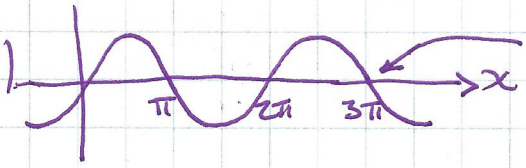
$Y_1 = x^3 + 4x$

USE TI:

$$f'(3) = \frac{f(3.001) - f(2.999)}{3.001 - 2.999}$$

$$f'(3) = \frac{Y_1(3.001) - Y_1(2.999)}{3.001 - 2.999} \approx 23.000001$$

⑦ $f(x) = \sin(x)$

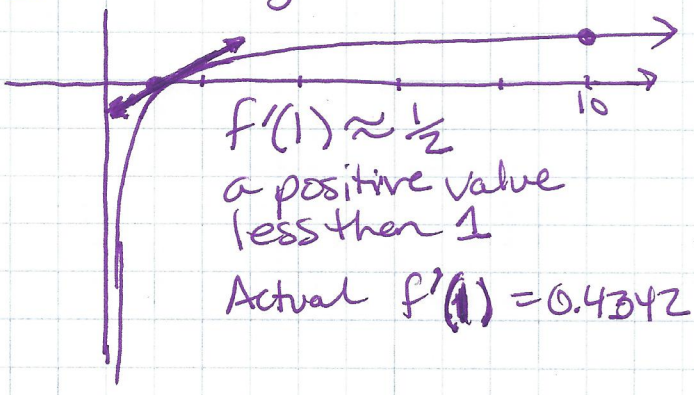


tangent line slope is negative at $x = 3\pi$

so derivative is negative

$f'(3\pi) = -1$

⑧ $f(x) = \log(x)$

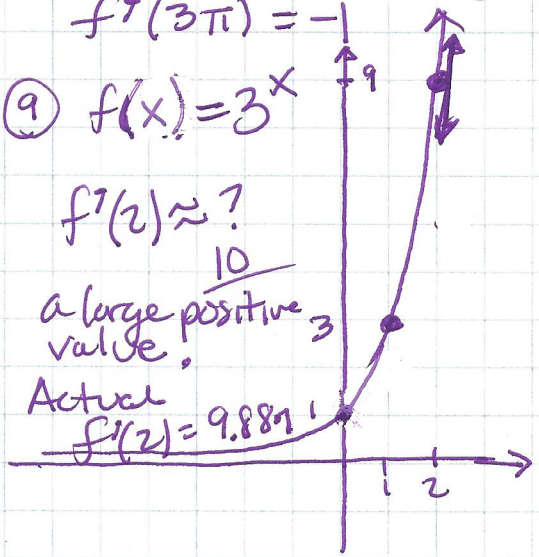


$f'(1) \approx \frac{1}{2}$

a positive value less than 1

Actual $f'(1) = 0.4342$

⑨ $f(x) = 3^x$



$f'(2) \approx ?$

10

a large positive value!

Actual $f'(2) = 9.8871$

(22) a) $f(x)$ is even & $f'(10) = 6$

so $f'(-10) = -6$

✱) $f(x)$ is odd & $f'(10) = 6$

so $f'(-10) = 6$

b) $f(x)$ is even and $f'(0)$ exists

$\therefore f'(0) = 0$.

(23) $g(x)$ is odd $g'(4) = 5$ $\therefore g'(-4) = 5$

(24) $f(x) = \sin(x)$ $f'(0) = 1$ (in radians)

$f'(0) = 0$ (in degrees.)

ALWAYS USE RADIANS in Calculus

degrees are reserved for units of Temperature.

Population of CHINA:

(31) $f(x) = 1.267(1.007)^x$

USE CALCULATOR:

$x = 0$ est $f'(0)$:

$$f'(0) \approx \frac{f(0.001) - f(-.001)}{0.001 - -0.001}$$

$f'(0) \approx 0.008838...$

✱ EXACT MATH: nDeriv(

$$\frac{d}{dx}(Y_1)\Big|_{x=0} = 0.008838$$

$x = 7$

$$f'(7) \approx \frac{f(7.001) - f(6.999)}{0.002}$$

$f'(7) \approx 0.0092803...$

✱ EXACT MATH: nDeriv(

$$\frac{d}{dx}(Y_1)\Big|_{x=7} = 0.0092803...$$