

HW11

$$2.13 \#2 \quad f(x) = x^2 - 46$$

$$f'(x) = 2x$$

$$(1) \quad x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$= 7 - \frac{49 - 46}{14}$$

$$= 6.785714$$

$$(2) \quad x_2 = 6.7857 - \frac{6.7857^2 - 46}{2 \times 6.7857}$$

$$= 6.782331$$

$$(3) \quad x_3 = 6.7823 - \frac{6.7823^2 - 46}{2 \times 6.7823}$$

$$= 6.782330$$

$$\#3 \quad f(x) = \sin x + x - 4$$

$$f'(x) = \cos x + 1$$

Use $\nabla x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$, we have

$$x_1 = 6.185040$$

$$x_2 = 5.138997$$

$$x_3 = 4.977288$$

$$x_4 = 4.967644$$

$$x_5 = 4.967608$$

$$x_6 = 4.967608$$

#6. $f(x) = x^4 - x^3 + 7x$

$$f'(x) = 4x^3 - 3x^2 + 7$$

use $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$, we have

$$x_1 = 2.57098765$$

$$x_2 = 1.76052202$$

$$x_3 = 0.91694504$$

$$x_4 = 0.07655415$$

2.14 #2 $f(x) = \sqrt{-4-x}$

$$f(-5) = 1$$

$$f'(x) = \frac{1}{2} \cdot \frac{1}{\sqrt{-4-x}} \cdot (-1) = \frac{-1}{2\sqrt{-4-x}}$$

$$f'(1-5) = \frac{-1}{2 \cdot 1} = -\frac{1}{2}$$

$$L(x) = 1 + (-\frac{1}{2})(x+5)$$

$$= -\frac{1}{2}x - \frac{3}{2}$$

#5 choose 81 \because $81 = 9^2$, and 81 is close to 83

$$f(x) = \sqrt{x}$$

$$f(81) = 9$$

$$f'(x) = \frac{1}{2\sqrt{x}}$$

$$f'(81) = \frac{1}{18}$$

$$L(x) = 9 + \frac{1}{18} \cdot (x - 81)$$

$$= \frac{1}{18}x + (9 - \frac{81}{18})$$

$$= \frac{1}{18}x + \frac{9}{2}$$

$$L(83) = \frac{1}{18} \times 83 + \frac{9}{2} = 9.1$$

#9 $f(x) = -2x^3 + 10\sin x$

$$f(\pi) = -2\pi^3$$

$$f'(x) = -6x^2 + 10\cos x$$

$$f'(\pi) = -6\pi^2 - 10$$

$$L(x) = -2\pi^3 + (-6\pi^2 - 10)(x - \pi)$$

$$= (-6\pi^2 - 10)x + (6\pi^3 - 2\pi^3 + 10\pi)$$

$$= (-6\pi^2 - 10)x + (4\pi^3 + 10\pi)$$

$$\uparrow$$
$$-69.218$$

$$\uparrow$$
$$155.441$$