Math 451

Q's ① Project 5

② Exam

Derivative(c)

Derivative(f,a)

ex: $p(x) = 3x^2 + 2x - 7$ $\quad p'(x) = 6x + 2$

[3 2 -7] [6 2]

ex: $f(x) = 3x^2 + 2x - 7$ $\quad a = 1$

$f'(1) = 8$

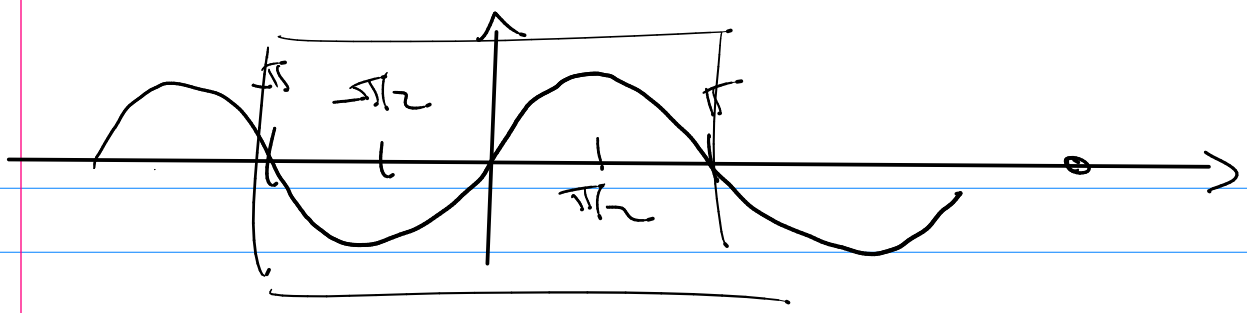
Derivative([3 2 -7])

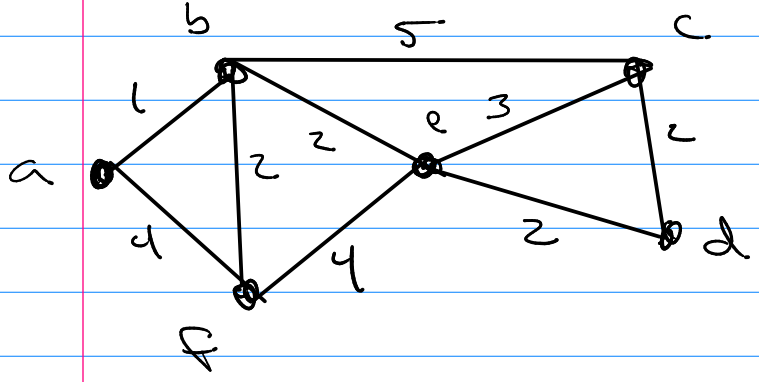
ans = [6 2]

→ Derivative(@(x) 3.*x.^2 + 2.*x - 7, 1)

ans = 8

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$



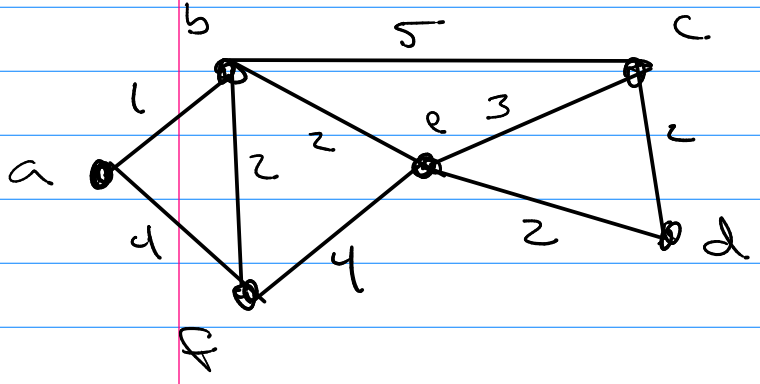


least cost paths from [a]

	path	cost
a to a ?	a	0
b ?	a, b	1
c ?	a, b, c	6
d ?	a, b, e, d	5
e ?	a, b, e	3
f ?	a, b, f	3

Dijkstra's Algorithm

G with vertices $v_1, v_2, \ldots, v_n$ weights $w(v_i, v_j)$



$$A_G = \begin{array}{c} \\ a \\ b \\ c \\ d \\ e \\ f \end{array} \begin{array}{c} \begin{array}{cccccc} a & b & c & d & e & f \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 4 \\ 1 & 0 & 5 & 0 & 2 & 2 \\ 0 & 5 & 0 & 2 & 3 & 0 \\ 0 & 0 & 2 & 0 & 2 & 0 \\ 0 & 2 & 3 & 2 & 0 & 4 \\ 4 & 2 & 0 & 0 & 4 & 0 \end{bmatrix} \end{array}$$

Basis: in A_G make all zeros to ∞

costs from a to any of the others starts at ∞

for your start vertex: a

Cellaneay [path] for a is $\{a\}$

[costs] for a is 0

Pseudo code

process dijkstra (A_G, a)

for i from to n ← number of vertices
costs of each $v_i = \infty$
cost of a = 0
path of a = {a}
found vertices = {a}
while not found vertices $\neq \phi$
find vertex [u] not found and cost of
path from a found vertex to u is min
found vertices = {found vertices, u}
cost of u = {path of found + cost to u}
end

$V = \{a, b, c, d, e\} \rightarrow [1\ 1\ 1\ 1\ 1]$

here $S = \{a, c, d\} \rightarrow [1\ 0\ 1\ 1\ 0]$