King Abdul Aziz University — Faculty of Sciences
Mathematics Department — Math 110
Workshop 11 — Sections 5.1+5.2
Professor Hamza Ali Abujabal — Prof_h_abujabal@yahoo.com

1) The absolute maximum value of $f(x)=x^3-2x^2$ in $[-1,2]$ is at $x=$

[A] $-1,0$ [B] $0,2$ [C] -1 [D] $\frac{4}{3}$

2) The absolute minimum value of $f(x)=x^3-3x^2+1$ in $\left[-\frac{1}{2},4\right]$ is

[A] 1 [B] -3 [C] 17 [D] $\frac{1}{8}$

3) The absolute maximum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[A] $(0,1)$ [B] $(0,2)$ [C] $(2,-11)$ [D] $(2,-13)$

4) The absolute minimum point of $f(x)=3x^2-12x+1$ in $[0,3]$ is

[A] $(0,1)$ [B] $(0,2)$ [C] $(2,-11)$ [D] $(2,-13)$

5) The absolute minimum point of $f(x)=3x^2-12x+2$ in $[0,3]$ is

[A] $(3,-7)$ [B] $(0,2)$ [C] $(2,-10)$ [D] $(2,-12)$

6) The values in $(-3,3)$ which make $f(x)=x^3-9x$ satisfy Rolle's Theorem on $[-3,3]$ are

[A] $\pm\sqrt{3}\in[-3,3]$ [B] $\pm1\in(-3,3)$ [C] $\pm2\in(-3,3)$ [D] $\pm\sqrt{3}\in(-3,3)$

7) The values in $(0,2)$ which make $f(x)=x^3-3x^2+2x+5$ satisfy Rolle's Theorem on $[0,2]$ are

[A] $1\pm\frac{4\sqrt{3}}{6}\in[0,2]$ [B] $-1\pm\frac{\sqrt{3}}{3}\in(0,2)$

[C] $1\pm\frac{\sqrt{3}}{3}\in(0,2)$ [D] $1\pm\frac{\sqrt{3}}{6}\in(0,2)$

8) The value c in $(0,5)$ which makes $f(x)=x^2-x-6$ satisfy the Mean Value Theorem on $[0,5]$ is

[A] $\frac{2}{5}\in(0,5)$ [B] $\frac{3}{2}\in(0,5]$

[C] $-\frac{5}{2}\in[0,5]$ [D] $\frac{5}{2}\in(-3,3)$

9) The value c in $(0,2)$ which makes $f(x)=x^3-x$ satisfy The Mean Value Theorem on $[0,2]$ is $\boxed{A}$ $\frac{2}{\sqrt{3}}\in(0,2)$ $\boxed{B}$ $-\frac{2}{\sqrt{3}}\in(0,2]$ $\boxed{C}$ $\frac{3}{\sqrt{2}}\in(0,2)$ $\boxed{D}$ $\pm\frac{2}{\sqrt{3}}\in(0,2)$
10) The value in $(0,1)$ which makes $f(x)=3x^2+2x+5$ satisfy the Mean Value Theorem on $[0,1]$ is $\boxed{A}$ $-\frac{1}{2}$ $\boxed{B}$ $\frac{1}{3}$ $\boxed{C}$ $\frac{1}{2}$ $\boxed{C}$ $\frac{2}{3}$
11) The critical numbers of the function $f(x)=x^3+3x^2-9x+1$ are $\boxed{A}$ $-1,3$ $\boxed{B}$ $-3,1$ $\boxed{C}$ ±3 $\boxed{D}$ ±1
12) The function $f(x)=x^3+3x^2-9x+1$ is decreasing on $\boxed{A}$ $(-\infty,-1)\cup(3,\infty)$ $\boxed{B}$ $(-3,1)$ $\boxed{C}$ $(-\infty,-3)\cup(1,\infty)$ $\boxed{D}$ $(-1,3)$
13) The function $f(x)=x^3+3x^2-9x+1$ is increasing on $\boxed{A}$ $(-\infty,-1)\cup(3,\infty)$ $\boxed{B}$ $(-3,1)$ $\boxed{C}$ $(-\infty,-3)\cup(1,\infty)$ $\boxed{D}$ $(-1,3)$
14) The function $f(x)=x^3+3x^2-9x+1$ has a relative maximum value $\boxed{A}$ $(-1,12)$ $\boxed{B}$ $(3,28)$ $\boxed{C}$ $(1,-4)$ $\boxed{D}$ $(-3,28)$
15) The function $f(x)=x^3+3x^2-9x+1$ has a relative minimum value $\boxed{A}$ $(-1,12)$ $\boxed{B}$ $(3,28)$ $\boxed{C}$ $(1,-4)$ $\boxed{D}$ $(-3,28)$
16) The graph of $f(x)=x^3+3x^2-9x+1$ concave upward on $\boxed{A}$ $(-1,\infty)$ $\boxed{B}$ $(1,\infty)$ $\boxed{C}$ $(-\infty,-1)$ $\boxed{D}$ $(-\infty,1)$
17) The graph of $f(x)=x^3+3x^2-9x+1$ concave downward on $\boxed{A}$ $(-1,\infty)$ $\boxed{B}$ $(1,\infty)$ $\boxed{C}$ $(-\infty,-1)$ $\boxed{D}$ $(-\infty,1)$
18) The function $f(x)=x^3+3x^2-9x+1$ has an inflection point at $\boxed{A}$ $(1,4)$ $\boxed{B}$ $(1,-4)$ $\boxed{C}$ $(-1,5)$ $\boxed{D}$ $(-1,12)$
19) The critical numbers of the function $f(x)=x^3-3x^2-9x+1$ are $\boxed{A}$ $-1,3$ $\boxed{B}$ $-3,1$ $\boxed{C}$ ±3 $\boxed{D}$ ±1
20) The function $f(x)=x^3-3x^2-9x+1$ is decreasing on $\boxed{A}$ $(-\infty,-1)\cup(3,\infty)$ $\boxed{B}$ $(-3,1)$ $\boxed{C}$ $(-\infty,-3)\cup(1,\infty)$ $\boxed{D}$ $(-1,3)$

21) The function $f(x)=x^3-3x^2-9x+1$ is increasing on

A $(-\infty,-1)\cup(3,\infty)$ B $(-3,1)$ C $(-\infty,-3)\cup(1,\infty)$ D $(-1,3)$

22) The function $f(x)=x^3-3x^2-9x+1$ has a relative maximum value at the point

A $(1,-10)$ B $(3,-26)$ C $(-1,6)$ D $(-3,-26)$

23) The function $f(x)=x^3-3x^2-9x+1$ has a relative minimum value at the point

A $(1,-10)$ B $(3,-26)$ C $(-1,6)$ D $(-3,-26)$

24) The graph of $f(x)=x^3-3x^2-9x+1$ concave upward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

25) The graph of $f(x)=x^3-3x^2-9x+1$ concave downward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

26) The function $f(x)=x^3-3x^2-9x+1$ has an inflection point at

A $(-1,6)$ B $(1,-10)$ C $(-1,-12)$ D $(1,8)$

27) The critical numbers of the function $f(x)=x^3+3x^2-9x+5$ are

A $-1,3$ B $-3,1$ C ± 3 D ± 1

28) The function $f(x)=x^3+3x^2-9x+5$ is decreasing on

A $(-1,3)$ B $(-3,1)$ C $(-\infty,-3)\cup(1,\infty)$ D $(-\infty,-1)\cup(3,\infty)$

29) The function $f(x)=x^3+3x^2-9x+5$ is increasing on

A $(-1,3)$ B $(-3,1)$ C $(-\infty,-3)\cup(1,\infty)$ D $(-\infty,-1)\cup(3,\infty)$

30) The function $f(x)=x^3+3x^2-9x+5$ has a relative minimum value at the point

A $(1,0)$ B $(-3,22)$ C $(1,1)$ D $(-3,32)$

31) The function $f(x)=x^3+3x^2-9x+5$ has a relative maximum value at the point

A $(1,0)$ B $(-3,22)$ C $(1,1)$ D $(-3,32)$

32) The function $f(x)=x^3+3x^2-9x+5$ has an inflection point at

A $(-1,16)$ B $(1,16)$

C $(-1,10)$ D $(1,0)$

33) The graph of $f(x)=x^3+3x^2-9x+5$ concave downward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

34) The graph of $f(x)=x^3+3x^2-9x+5$ concave upward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

35) The critical numbers of the function $f(x)=x^3-3x^2-9x+5$ are

A $-1,3$ B $-3,1$ C ± 3 D ± 1

36) The function $f(x)=x^3-3x^2-9x+5$ is increasing on

A $(-1,3)$ B $(-3,1)$ C $(-\infty,-3)\cup(1,\infty)$ D $(-\infty,-1)\cup(3,\infty)$

37) The function $f(x)=x^3-3x^2-9x+5$ is decreasing on

A $(-1,3)$ B $(-3,1)$ C $(-\infty,-3)\cup(1,\infty)$ D $(-\infty,-1)\cup(3,\infty)$

38) The function $f(x)=x^3-3x^2-9x+5$ has a relative maximum value at the point

A $(-1,10)$ B $(3,-22)$ C $(-1,-9)$ D $(3,32)$

39) The function $f(x)=x^3-3x^2-9x+5$ has a relative minimum value at the point

A $(-1,10)$ B $(3,-22)$ C $(-1,-9)$ D $(3,32)$

40) The graph of $f(x)=x^3-3x^2-9x+5$ concave upward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

41) The graph of $f(x)=x^3-3x^2-9x+5$ concave downward on

A $(-1,\infty)$ B $(1,\infty)$ C $(-\infty,-1)$ D $(-\infty,1)$

42) The function $f(x)=x^3-3x^2-9x+5$ has an inflection point at

A $(-1,10)$ B $(1,-6)$ C $(-1,-9)$ D $(1,-10)$

43) The critical numbers of the function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ are

a $1,2$ b $-2,1$ c $-1,2$ d $-1,-2$

44) The function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ is increasing on

a $(-1,2)$ b $(-\infty,-2)\cup(1,\infty)$ c $(-2,1)$ d $(-\infty,-1)\cup(2,\infty)$

45) The function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ is decreasing on

a $(-1,2)$ b $(-\infty,-2)\cup(1,\infty)$ c $(-2,1)$ d $(-\infty,-1)\cup(2,\infty)$

46) The function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ has a relative maximum point

a $(1,-7/6)$ b $(-1,13/6)$ c $(-2,1/3)$ d $(2,-7/3)$

47) The function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ has a relative minimum point

a $(1,-7/6)$ b $(-1,13/6)$ c $(-2,1/3)$ d $(2,-7/3)$

48) The graph of $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ concave upward on

a $(-\infty,-1/2)$ b $(-\infty,1/2)$ c $(-1/2,\infty)$ d $(1/2,\infty)$

49) The graph of $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ concave downward on

a $(-\infty,-1/2)$ b $(-\infty,1/2)$ c $(-1/2,\infty)$ d $(1/2,\infty)$

50) The function $f(x)=\frac{1}{3}x^3-\frac{1}{2}x^2-2x+1$ has an inflection point at

a $(1/2,-1/12)$ b $(1/2,1/12)$ c $(-1/2,11/6)$ d $(-1/2,-11/6)$

51) The critical numbers of the function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ are

a $1,2$ b $-2,1$ c $-1,2$ d $-1,-2$

52) The function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ is increasing on

a $(-1,2)$ b $(-\infty,-2)\cup(1,\infty)$ c $(-2,1)$ d $(-\infty,-1)\cup(2,\infty)$

53) The function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ is decreasing on

a $(-1,2)$ b $(-\infty,-2)\cup(1,\infty)$ c $(-2,1)$ d $(-\infty,-1)\cup(2,\infty)$

54) The function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ has a relative maximum point

a $(1,-1/6)$ b $(-1,19/6)$

c $(-2,13/3)$ d $(2,5/3)$

55) The function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ has a relative minimum point

[a] $(1,-\frac{1}{6})$ [b] $(-1,\frac{19}{6})$ [c] $(-2,\frac{13}{3})$ [d] $(2,\frac{5}{3})$

56) The graph of $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ concave upward on

[a] $(-\infty,-\frac{1}{2})$ [b] $(-\infty,\frac{1}{2})$ [c] $(-\frac{1}{2},\infty)$ [d] $(\frac{1}{2},\infty)$

57) The graph of $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ concave downward on

[a] $(-\infty,-\frac{1}{2})$ [b] $(-\infty,\frac{1}{2})$ [c] $(-\frac{1}{2},\infty)$ [d] $(\frac{1}{2},\infty)$

58) The function $f(x)=\frac{1}{3}x^3+\frac{1}{2}x^2-2x+1$ has an inflection point at

[a] $(\frac{1}{2},\frac{-1}{12})$ [b] $(\frac{1}{2},\frac{1}{6})$ [c] $(-\frac{1}{2},\frac{25}{12})$ [d] $(-\frac{1}{2},\frac{49}{24})$

59) The critical numbers of the function $f(x)=x^3-12x+3$ are

[A] $x=-2, x=2$ [B] $x=-6, x=6$ [C] $x=2$ [D] $x=-2$

60) The function $f(x)=x^3-12x+3$ is increasing on

[A] $(2,\infty)$ [B] $(-2,2)$ [C] $(-\infty,-2)\cup(2,\infty)$ [D] $(-\infty,-2)$

61) The function $f(x)=x^3-12x+3$ is decreasing on

[A] $(2,\infty)$ [B] $(-2,2)$ [C] $(-\infty,-2)\cup(2,\infty)$ [D] $(-\infty,-2)$

62) The function $f(x)=x^3-12x+3$ has a relative maximum point at

[A] $(-2,19)$ [B] $(-2,-19)$ [C] $(2,-13)$ [D] $(2,13)$

63) The function $f(x)=x^3-12x+3$ has a relative minimum point at

[A] $(-2,19)$ [B] $(-2,-19)$ [C] $(2,-13)$ [D] $(2,13)$

64) The graph of $f(x)=x^3-12x+3$ concave upward on

[A] $(0,\infty)$ [B] $(-\infty,0)$ [C] $(-\infty,1)$ [D] $(1,\infty)$

65) The graph of $f(x)=x^3-12x+3$ concave downward on

[A] $(0,\infty)$ [B] $(-\infty,0)$ [C] $(-\infty,1)$ [D] $(1,\infty)$

66) The function $f(x)=x^3-12x+3$ has an inflection point at

[A] $(0,-12)$ [B] $(0,0)$

[C] $(3,0)$ [D] $(0,3)$

67) The critical numbers of the function $f(x)=x^3-3x^2+1$ are	
A $x=-2, x=0$ B $x=0, x=2$ C $x=2$ D $x=0$	
68) The function $f(x)=x^3-3x^2+1$ is increasing on	
A $(2,\infty)$ B $(0,2)$ C $(-\infty,0)\cup(2,\infty)$ D $(-\infty,0)$	
69) The function $f(x)=x^3-3x^2+1$ is decreasing on	
A $(2,\infty)$ B $(0,2)$ C $(-\infty,0)\cup(2,\infty)$ D $(-\infty,0)$	
70) The function $f(x)=x^3-3x^2+1$ has a relative maximum point at	
A $(2,-3)$ B $(0,1)$ C $(-2,0)$ D $(0,0)$	
71) The function $f(x)=x^3-3x^2+1$ has a relative minimum point at	
A $(2,-3)$ B $(0,1)$ C $(-2,0)$ D $(0,0)$	
72) The graph of $f(x)=x^3-3x^2+1$ concave upward on	
A $(-\infty,-1)$ B $(-\infty,1)$ C $(1,\infty)$ D $(-1,\infty)$	
73) The graph of $f(x)=x^3-3x^2+1$ concave downward on	
A $(-\infty,-1)$ B $(-\infty,1)$ C $(1,\infty)$ D $(-1,\infty)$	
74) The function $f(x)=x^3-3x^2+1$ has an inflection point at	
A $(1,1)$ B $(1,0)$ C $(1,-1)$ D $(-1,-3)$	
75) The critical numbers of the function $f(x)=x^3-3x^2+2$ are	
a $-2,0$ b $0,2$ c 2 d 0	
76) The function $f(x)=x^3-3x^2+2$ is increasing on	
a $(-2,0)$ b $(-\infty,-2)\cup(0,\infty)$ c $(0,2)$ d $(-\infty,0)\cup(2,\infty)$	
77) The function $f(x)=x^3-3x^2+2$ is decreasing on	
a $(-2,0)$ b $(-\infty,-2)\cup(0,\infty)$ c $(0,2)$ d $(-\infty,0)\cup(2,\infty)$	
78) The function $f(x)=x^3-3x^2+2$ has a relative minimum point at	
a $(0,2)$ b $(-2,-18)$ c $(0,1)$ d $(2,-2)$	
79) The function $f(x)=x^3-3x^2+2$ has a relative maximum point at	
a $(0,2)$ b $(-2,-18)$ c $(0,1)$ d $(2,-2)$	
80) The graph of $f(x)=x^3-3x^2+2$ concave downward on	
a $(-\infty,1)$ b $(-\infty,-1)$ c $(1,\infty)$ d $(-1,\infty)$	

81) The graph of $f(x)=x^3-3x^2+2$ concave upward on

$\boxed{a}$ $(-\infty,1)$ $\boxed{b}$ $(-\infty,-1)$ $\boxed{c}$ $(1,\infty)$ $\boxed{d}$ $(-1,\infty)$

82) The function $f(x)=x^3-3x^2+2$ has an inflection point at

$\boxed{a}$ $(1,0)$ $\boxed{b}$ $(1,-1)$ $\boxed{c}$ $(0,2)$ $\boxed{d}$ $(-1,-2)$

83) The critical numbers of the function $f(x)=x^3-6x^2-36x$ are

$\boxed{A}$ $-2,6$ $\boxed{B}$ $-6,2$ $\boxed{C}$ $-6,-2$ $\boxed{D}$ $2,6$

84) The function $f(x)=x^3-6x^2-36x$ is decreasing on

$\boxed{A}$ $(-\infty,-6)\cup(2,\infty)$ $\boxed{B}$ $(-2,6)$ $\boxed{C}$ $(-\infty,-2)\cup(6,\infty)$ $\boxed{D}$ $(-6,2)$

85) The function $f(x)=x^3-6x^2-36x$ is increasing on

$\boxed{A}$ $(-\infty,-6)\cup(2,\infty)$ $\boxed{B}$ $(-2,6)$ $\boxed{C}$ $(-\infty,-2)\cup(6,\infty)$ $\boxed{D}$ $(-6,2)$

86) The function $f(x)=x^3-6x^2-36x$ has a relative minimum value at the point

$\boxed{A}$ $(2,-88)$ $\boxed{B}$ $(-2,40)$ $\boxed{C}$ $(6,-216)$ $\boxed{D}$ $(-6,-216)$

87) The function $f(x)=x^3-6x^2-36x$ has a relative maximum value at the point

$\boxed{A}$ $(2,88)$ $\boxed{B}$ $(-2,40)$ $\boxed{C}$ $(6,-216)$ $\boxed{D}$ $(-6,-216)$

88) The function $f(x)=x^3-6x^2-36x$ has an inflection point at

$\boxed{A}$ $(2,88)$ $\boxed{B}$ $(-2,-40)$ $\boxed{C}$ $(-2,40)$ $\boxed{D}$ $(2,-88)$

89) The graph of $f(x)=x^3-6x^2-36x$ concave downward on

$\boxed{A}$ $(-2,\infty)$ $\boxed{B}$ $(2,\infty)$ $\boxed{C}$ $(-\infty,-2)$ $\boxed{D}$ $(-\infty,2)$

90) The graph of $f(x)=x^3-6x^2-36x$ concave upward on

$\boxed{A}$ $(-2,\infty)$ $\boxed{B}$ $(2,\infty)$ $\boxed{C}$ $(-\infty,-2)$ $\boxed{D}$ $(-\infty,2)$

91) The critical numbers of the function $f(x)=-x^3-6x^2-9x+1$ are

$\boxed{A}$ $-3,1$ $\boxed{B}$ $-3,-1$ $\boxed{C}$ $1,3$ $\boxed{D}$ $-1,3$

92) The function $f(x)=-x^3-6x^2-9x+1$ is decreasing in

$\boxed{A}$ $(-\infty,-3)\cup(-1,\infty)$ $\boxed{B}$ $(-3,-1)$ $\boxed{C}$ $(-\infty,1)\cup(3,\infty)$ $\boxed{D}$ $(1,3)$

93) The function $f(x)=-x^3-6x^2-9x+1$ is increasing in

$\boxed{A}$ $(-\infty,-3)\cup(-1,\infty)$ $\boxed{B}$ $(-3,-1)$

$\boxed{C}$ $(-\infty,1)\cup(3,\infty)$ $\boxed{D}$ $(1,3)$

94) The function $f(x) = -x^3 - 6x^2 - 9x + 1$ has a relative minimum value at the point

A $(3,-107)$ B $(1,15)$

C $(-1,5)$ D $(-3,1)$

95) The function $f(x) = -x^3 - 6x^2 - 9x + 1$ has a relative maximum value at the point

A $(3,-107)$ B $(1,15)$ C $(-1,5)$ D $(-3,1)$

96) The function $f(x) = -x^3 - 6x^2 - 9x + 1$ has an inflection point at

A $(2,-40)$ B $(-2,-40)$ C $(-2,3)$ D $(2,3)$

97) The graph of $f(x) = -x^3 - 6x^2 - 9x + 1$ concave downward on

A $(-2,\infty)$ B $(2,\infty)$ C $(-\infty,-2)$ D $(-\infty,2)$

98) The graph of $f(x) = -x^3 - 6x^2 - 9x + 1$ concave upward on

A $(-2,\infty)$ B $(2,\infty)$ C $(-\infty,-2)$ D $(-\infty,2)$