1) Find an equation of a line whose slope is 3 and passing through the point of intersection of the lines $x - 3y + 12 = 0$ and $2x + y + 3 = 0$.

2) Solve the inequality $\frac{2x-5}{x-2} \leq 1$ and sketch the solution on a coordinate line.

3) Find D_{f+g} and $D_{f/g}$ if, $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{4 - x^2}$.

4) Prove or disprove, if f is continuous at a point x, then f is also differentiable at x.

5) Determine open intervals on which $f(x) = x^2 - 4x + 3$ is increasing, decreasing, concave up, concave down and find critical points.

6) Prove that, $\cos^{-1}(\frac{3}{\sqrt{10}}) + \cos^{-1}(\frac{2}{\sqrt{5}}) = \frac{\pi}{4}$.

7) Show that, $\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$ $(x \geq 1)$.

8) Determine whether the equation $x^2 + y^2 - 2x - 4y - 11 = 0$ represents a circle, a point, or no graph. If the equation represents a circle, find the center and radius.

9) Find x and y if the line through $(0,0)$ and (x, y) has slope $\frac{1}{2}$, and the line through(x, y) and $(7,5)$ has slope 2.

10) Solve the inequality $\frac{3}{|2x-1|} \geq 4$ and sketch the solution on a coordinate line.

11) Find D_{f+g} ,$D_{f \cdot g}$, $D_{f/g}$, R_f and R_g if, $f(x) = 1 + \sqrt{x-2}$ and $g(x) = x - 3$.

12) Show that $f(x) = \begin{cases} x^2 + 1, & x \leq 1 \\ 2x, & x > 1 \end{cases}$ is continuous and differentiable at $x = 1$.

13) Determine open intervals on which $f(x) = x^3$ is increasing, decreasing, concave up, concave down and find critical points.

14) Prove that, $\tan^{-1}(\frac{1}{2}) + \tan^{-1}(\frac{1}{3}) = \frac{\pi}{4}$.

15) Show that, $\coth^{-1} x = \frac{1}{2}\ln(\frac{x+1}{x-1})$ $(|x| > 1)$.

16) Determine whether the equation $2x^2 + 2y^2 + 4x - 4y = 0$ represents a circle, a point, or no graph. If the equation represents a circle, find the center and radius.

17) Find x if the slope of the line through $(1,2)$ and $(x, 0)$ is the negative of the slope of the line through $(4,5)$ and $(x, 0)$.

18) Solve the inequality $|x + 3| < |x - 8|$ and sketch the solution on a coordinate line.

19) Find D_{f+g} and $D_{f/g}$ if, $f(x) = \sqrt{5 - x}$ and $g(x) = \sqrt{x - 3}$.

20) Show that $f(x) = \begin{cases} x^2 + 2, & x \le 1 \\ x + 2, & x > 1 \end{cases}$ is continuous but not differentiable at $x = 1$.

21) Determine open intervals on which $f(x) = x^3 - 3x^2 + 1$ is increasing, decreasing, concave up, concave down and find critical points.

22) Prove that, $2\tan^{-1}(\frac{1}{3}) + \tan^{-1}(\frac{1}{7}) = \frac{\pi}{4}$.

23) Show that, $\operatorname{csch}^{-1} x = \ln(\frac{1}{x} + \frac{\sqrt{1+x^2}}{|x|})$ $(x \neq 0)$.

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$$f(x) = 1 + \sqrt{x - 2} \text{ and } g(x) = x - 3.$$

29) Sketch the graph of the function defined by the formula

$$f(x)=\begin{cases}0\ , & x\le -1\\ \sqrt{1-x^2} & ,-1<x<1\\ x\ \ , & x\ge 1\end{cases}$$

30) Let $f(x)=\begin{cases}x^2+ax+b, & x>2\\ x^3, & x\le 2\end{cases}$. Find a and b such that f is differentiable at $x=2$.

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34) Does $f(x)=x^3-12x$ satisfy the conditions of Rolle's Theorem on $[0,2\sqrt{3}]$ (explain your answer).

35) Find a) $\lim_{x\to\infty}(\sqrt{x^6+5}-x^3)$ b) $\lim\limits_{x\to 4}\frac{2-x}{(x-4)(x+2)}$.

36) Solve the inequality $\frac{1}{|x-1|} < 2$ and sketch the solution on a coordinate line.

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a) $y = 4x - 7$ and $y = 4x + 9$

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d) $y - 2 = 4(x - 3)$ and $y - 7 = \frac{1}{4}(x - 3)$

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f) $y = x$ and $y = -x$

g) $y = 3$ and $y = 1$

38) Determine whether the equation $x^2 + y^2 - 2x - 4y - 11 = 0$ represents a circle, a point, or no graph. If the equation represents a circle, find the center and radius.

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40) Sketch the graph of $f(x) = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$.

41) Prove or disprove, if f is continuous at a point x_1, then f is differentiable at x_1.

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43) Prove that, $\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$ $(x \geq 1)$.

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45) Find a) $\lim_{x\to\infty}(\sqrt{x^6 + 5x^3} - x^3)$ b) $\lim_{x\to -3} \frac{|x+3|}{x+3}$.

46) Find the value of x, if $\tan(\frac{\pi}{4} + \tan^{-1}(x)) = \tan{-1(3)}$.

47) Solve the inequality $|5 - 2x| \geq 4$ and sketch the solution on a coordinate line.

48) Find an equation of a line whose slope is 3 and passing through the point of intersection of the lines $x - 3y + 12 = 0$ and $2x + y + 3 = 0$.

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50) Find D_f , D_g, $D_{f/g}$, D_{f+g}, $D_{f\cdot g}$, R_f , R_g if,

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52) Prove or disprove, if f is differentiable at a point x_1, then f is continuous at x_1.

53) Determine open intervals on which $f(x) = \frac{2}{3}x^3 - \frac{1}{2}x^2 - 6x + 3$ is increasing, decreasing, concave up, concave down, and find critical points, maximum and minimum points, inflection points.

54) Find a) $\lim_{x\to\infty} \sqrt[3]{\frac{3x+5}{6x-8}}$ b) $\lim\limits_{h\to 0} \frac{(2-h)^3-8}{h}$.

55) Prove that, $\coth^{-1} x = \frac{1}{2}\ln(\frac{x+1}{x-1})$ $(|x| > 1)$.

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62) Let $f(x)=\begin{cases} x^2+ax+b, & x>2 \\ x^3, & x\leq 2 \end{cases}$. Find a and b such that f is differentiable at $x=2$.

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65) Find a) $\lim_{x\to\infty}(\sqrt{x^6+5}-x^3)$ b) $\lim\limits_{x\to 4}\frac{2-x}{(x-4)(x+2)}$

66) Show that, $\coth^{-1}x=\frac{1}{2}\ln(\frac{x+1}{x-1})$ $(|x|>1)$.

67) Find x and y if the line through (0,0) and (x,y) has slope $\frac{1}{2}$, and the line through (x,y) and (7,5) has slope 2.

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69) Sketch the graph of $y = x^2 - 4x + 5$.

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74) Find a) $\lim_{x\to\infty}(\sqrt{x^6 + 5x^3} - x^3)$ b) $\lim_{x\to -3} \frac{|x+3|}{x+3}$.

75) Show that, $\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$ $(x \geq 1)$.

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82) Does $f(x) = x^3 - 12x$ satisfy the conditions of Rolle's Theorem on $[0, 2\sqrt{3}]$?(explain your answer).

83) Find a) $\lim_{x\to\infty} \sqrt[3]{\frac{3x+5}{6x-8}}$ b) $\lim_{h\to 0} \frac{(2-h)^3-8}{h}$.

84) Show that, $\operatorname{csch}^{-1} x = \ln(\frac{1}{x} + \frac{\sqrt{1+x^2}}{|x|})$ $(x \neq 0)$.

85) Find $\lim_{x\to\infty} \frac{2x^4+3x^2+20}{3x^4+5}$.

86) Evaluate $\int \frac{x^2-3x+1}{x+1} dx$.

87) Find D_f and R_f if, $y = f(x) = \sqrt{4-x^2}$.

88) Does $f(x) = 9 - x^2$ satisfy the conditions of Rolle's Theorem on [-2,2]?(explain your answer).

89) Show that $f(x) = \begin{cases} x^2+2, & x \leq 1 \\ x+2, & x > 1 \end{cases}$ is continuous at $x = 1$.

90) Solve the inequality $|x-5| \leq 9$.

91) Find x if the slope of the line through (1,2) and $(x, 0)$ is the negative of the line through (4,5) and $(x, 0)$.

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f) $y = x$ and $y = -x$

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