Math Summer Assignment for

Multivariable Calculus

Wall Township Math Department
Optional Summer Assignment

★ This summer assignment is intended to prepare you for the math course above.
★ You will find examples and video links to help you complete the practice.

Skill 1: Evaluating Limits Algebraically

Helpful Video Link:

- FINDING LIMITS ALGEBRAICALLY
- Try to directly substitute.
- If you obtain 0/0 then try to simplify
  - Recall strategies to simplify: Factor and cancel, rationalize numerators or denominators, use LCD to destroy complex fractions

Practice:

1)	$\lim_{x\to 1} 5x^3 - 6x^2 + 2x - 1$	2)	$\lim_{x\to 2} \dfrac{x^3 - 2x^2}{x^2 - 4}$
3)	$\lim_{x\to -1} \dfrac{x+1}{\sqrt{x+5}-2}$	4)	$\lim_{x\to 2} \dfrac{x+2}{x-2}$
5)	$\lim_{x\to -3} f(x) = \begin{cases} \sqrt{x+7} & \text{if } -7 \le x \le -3 \\ x^2 - 5 & \text{if } x > -3 \end{cases}$	6)	$\lim_{x\to 0} \dfrac{\frac{1}{x+6} - \frac{1}{6}}{x}$

Skill 2: Compute derivatives using basic derivative rules

Helpful Video Link:

- ➔ List of Derivative Rules
- ➔ Product Rule Video Review: https://youtu.be/BRbopmMOuDY
- ➔ Quotient Rule Video Review: https://youtu.be/4xQPlM6E2dk

Practice

1)	$\frac{d}{dx}(2x^2 - 6x + 5)$ at $x = -4$	2)	$\frac{d}{dx}\left(\frac{1}{x^4} - \frac{3}{x^2}\right)$ at $x = 1$
3)	Find y' if $y = (2x^2 - 4x)(3x - 5)$	4)	Find $f'(x)$ if $f(x) = \frac{4x - 3}{2x + 1}$

For #5 and #6:

Use the chart to find $h'(4)$

$f(4)$	$f'(4)$	$g(4)$	$g'(4)$
-8	3	3π	4

5)	$h(x) = f(x)g(x)$	6)	$h(x) = \frac{f(x) + g(x)}{x}$

Skill 3: Compute derivatives of composite, trigonometric, exponential, and logarithmic functions.

Helpful Links:

- ➔ List of Derivative Rules
- ➔ Chain Rule Video Review: https://youtu.be/WHwMoGOLO44

Practice:

1)	$\frac{d}{dx}[(8+7x)^4]$	2)	Let $g(x) = e^{\tan x}$. Find $g'(x)$.
3)	$y = \cos^4(x)$ $\frac{dy}{dx} = ?$	4)	Let $g(x) = (2x^3 + x2 - 6x)^{\frac{2}{3}}$. Find $g'(2)$.
5)	$\frac{d}{dx}[-4e^x - \sin x - 9]$	6)	$\frac{d}{dx}[-ln(x) + x^2]$

Skill 4: Compute indefinite and definite integrals of basic functions

Helpful Links:

- ➔ Basic Antiderivative Rules
- ➔ For indefinite integral, use antiderivative rules and don't forget the "+C"
- ➔ For definite integrals, apply the Fundamental Theorem of Calculus.
- ➔ Antiderivatives Video Review: https://youtu.be/xVxe-vuiI1w
- ➔ Fundamental Theorem of Calculus Video Review: https://youtu.be/2zVBpluMv1M

Practice:

1)	$\int (x^4 + x^3 - x^2)dx$	2)	$\int (5\sqrt[3]{x})dx$
3)	$\int (sec^2 t - csc^2 t + 1)dt$	4)	$\int_{-1}^{2} \left(x - \frac{1}{x^2}\right) dx$
5)	$\int_0^{\pi} (2x - \sin x)dx$	6)	$\int_0^{\frac{\pi}{2}} (3\sin x - 2\cos x)dx$

Skill 5: Evaluate indefinite integrals using u-substitution

Helpful Video Link:

➔ U-substitution Video Review: https://youtu.be/o3odCSqYc98

Practice:

1)	$\int \sqrt{x-2}\ dx$	2)	$\int (3-2x)^8\ dx$
3)	$\int \sin 5x\ dx$	4)	$\int \dfrac{dx}{(8x-1)^2}$
5)	$\int \dfrac{5}{4-3x}\ dx$	6)	$\int e^{6x} dx$