Summer Assignment for DE Calculus I

1) You may use reference materials to complete this assignment.
2) The following sites may be useful:
3) The assignment covers material you must know in order to be successful in Calculus.
4) Please take the assignment seriously.
5) The assignment is due the 1st Monday of the Academic Year 2024/2025
6) The Assignment will be used as a Quiz Grade.
7) Please email at isaac.zawolo@apsva.us or abdoul.sall@apsva.us should you have any questions.

***Name:_____ Date of submission: _____***

***Show all work – no credit will be awarded for answers missing appropriate work.***
***No calculators!***

# I. Functions and Relations: Domain

I. **Find the domain. Write the solution in set notation.**

1) $f(x)=\sqrt{5x-1}$

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

3) $g(x)=\dfrac{3}{x-4}$

4) $h(x)=\dfrac{3}{x^2+12}$

5) $p(x)=\dfrac{3}{x^2+4x-12}$

6) $d(x)=\dfrac{2x-3}{2x^2+7x-15}$

7) $d(x)=\dfrac{\sqrt{3+5x}}{7x^2-35x-14}$

8) $d(x)=\dfrac{\sqrt{4-9x}}{x}$

9) $f(x)=\dfrac{x^3-27}{x^2-3x-18}$

10) $f(x)=\dfrac{x^2-4x+7}{4x^3-32}$

## II. Functions: Arithmetic, Composition and Inverse Functions

**Find the indicated.**

$$f(x) = 3x - 2$$
$$g(x) = x^2 - 3x - 28$$
$$h(x) = \frac{1}{x}$$

1) Evaluate $f(4) + -3g(-3)$

2) Evaluate $5f(0) + h(-2)$

3) Evaluate $g(x+h)$

4) Evaluate $f\left(\frac{2}{x}\right)$

5) Evaluate $\frac{g(x)}{f(-2x)}$

6) Find $f(g(x))$ and its domain

7) $g(f(x))$

8) $h(g(x))$

9) $g(h(x))$

10) $f(g(x-1))$

11) $g(f(x+2))$

For each of the following, find the difference quotient. The difference quotient is given by:

$$\frac{f(x+h) - f(x)}{h}$$

12) $f(x)=3x-2$

13) $g(x)=x^2-3x-28$

14) $h(x)=\frac{1}{x}$

15) $k(x)=\sqrt{x+4}$

**Find the inverse of each of the**

16) $g(x)=2x+5$

17) $h(x)=\frac{3}{x-4}$

18) $m(x)=\sqrt[3]{x+7}$

19) $f(x)=x^3-1$

20) $f(x)=x^2-1$ for $x\geq 1$

## III. Asymptotes, End behavior of Rational Functions Solving Quadratic Equations

For each of the following, find the indicated.

| Function | Find or complete. If not possible, write N/A |
|---|---|
| 1) $h(x)=\frac{3}{x-4}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$ , $y\to ?$ and As $x\to\infty$ , $y\to ?$<br>✔ As $x\to 4^-$ , $y\to ?$ and As $x\to 4^+$ , $y\to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

| Function | Find or complete. If not possible, write N/A |
|---|---|
| 2) $h(x)=\frac{x^2}{x^2-9}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$, $y\to ?$ and As $x\to\infty$, $y\to ?$<br>✔ As $x\to 3^-$, $y\to ?$ and As $x\to 3^+$, $y\to ?$<br>✔ As $x\to -3^-$, $y\to ?$ and As $x\to -3^+$, $y\to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

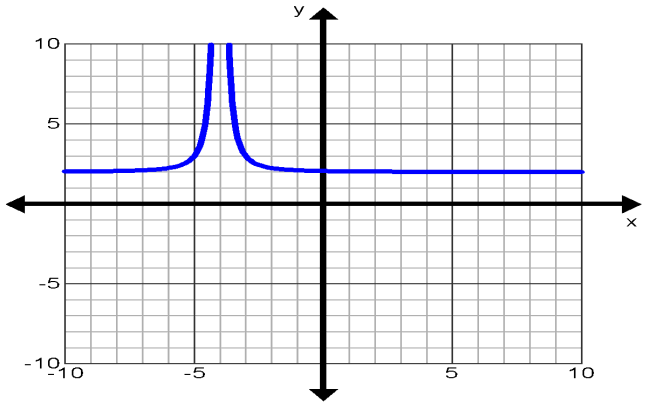
| Function | Find or complete. If not possible, write N/A |
|---|---|
| 3) $f(x)=\frac{x-1}{x^2+x-2}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$, $y\to ?$ and As $x\to\infty$, $y\to ?$<br>✔ As $x\to 2^-$, $y\to ?$ and As $x\to 2^+$, $y\to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

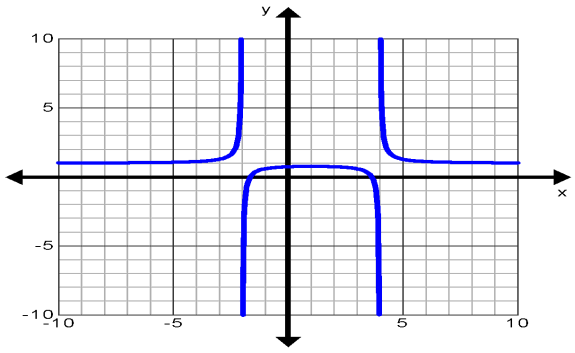
| Function | Find or complete. If not possible, write N/A |
|---|---|
| 4) $g(x)=\frac{5+x}{x^2(1-x)}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$, $y\to ?$ and As $x\to\infty$, $y\to ?$<br>✔ As $x\to 1^-$, $y\to ?$ and As $x\to 1^+$, $y\to ?$<br>✔ As $x\to 0^-$, $y\to ?$ and As $x\to 0^+$, $y\to ?$<br>✔ The x-intercept/s |

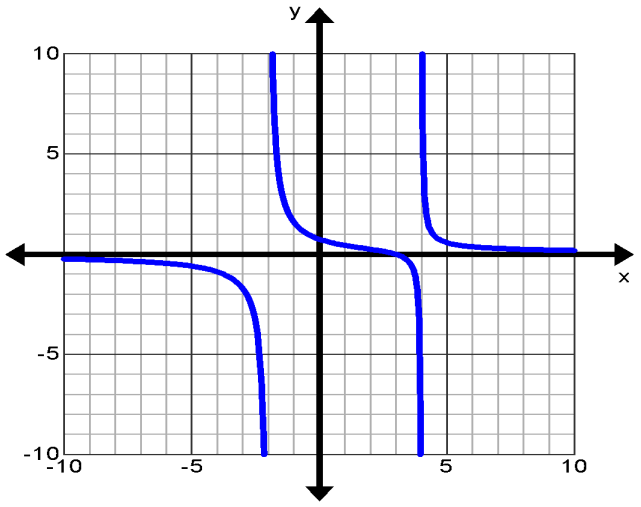
| | |
|---|---|
| | ✔ The y-intercept/s |

| Function | Find or complete. If not possible, write N/A |
|---|---|
| 6) $f(x)=\frac{3x^2}{5x^2-7}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$ , $y\to ?$ and As $x\to\infty$ , $y\to ?$<br>✔ As $x\to\frac{5\sqrt{7}^-}{5}$ , $y\to ?$ and As $x\to\frac{5\sqrt{7}^+}{5}$ , $y\to ?$<br>✔ As $x\to-\frac{5\sqrt{7}^-}{5}$ , $y\to ?$ and As $x\to-\frac{5\sqrt{7}^+}{5}$ , $y\to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

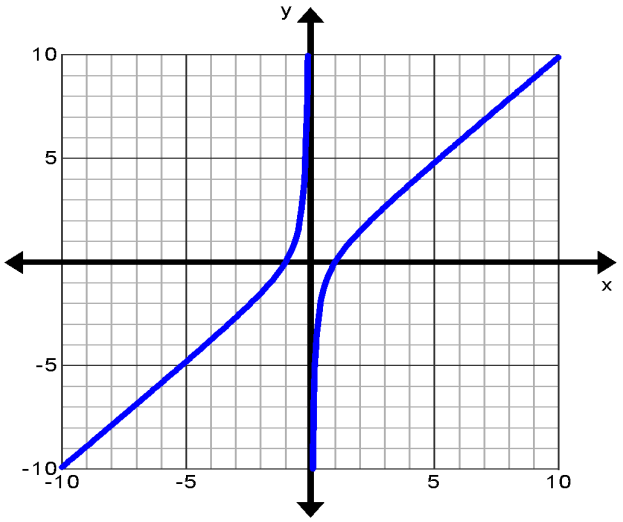
| Function | Find or complete. If not possible, write N/A |
|---|---|
| 5) $g(x)=\frac{6-x}{x^2-36}$ | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x\to-\infty$ , $y\to ?$ and As $x\to\infty$ , $y\to ?$<br>✔ As $x\to-6^-$ , $y\to ?$ and As $x\to-6^+$ , $y\to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

| Function | Find or complete. If not possible, write N/A |
|---|---|
| 7)<br>  <br> | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x \to -\infty$ , $y \to ?$ and As $x \to \infty$ , $y \to ?$<br>✔ As $x \to -4^-$ , $y \to ?$ and As $x \to -4^+$ , $y \to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

| Function<br>8) | Find or complete. If not possible, write N/A |
|---|---|
|  <br> | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x \to -\infty$ , $y \to ?$ and As $x \to \infty$ , $y \to ?$<br>✔ As $x \to 4^-$ , $y \to ?$ and As $x \to 4^+$ , $y \to ?$<br>✔ As $x \to -2^-$ , $y \to ?$ and As $x \to -2^+$ , $y \to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

| **Function**<br>**9)** | **Find or complete. If not possible, write N/A** |
|---|---|
|  | ✔ The Vertical asymptote<br>✔ The horizontal asymptote<br>✔ The Slant Asymptote<br>✔ As $x \to -\infty$ , $y \to ?$ and As $x \to \infty$ , $y \to ?$<br>✔ As $x \to 4^-$ , $y \to ?$ and As $x \to 4^+$ , $y \to ?$<br>✔ As $x \to -2^-$ , $y \to ?$ and As $x \to -2^+$ , $y \to ?$<br>✔ The x-intercept/s<br>✔ The y-intercept/s |

| **Function**<br>**10)** | **Find or complete. If not possible, write N/A** |
|---|---|




- ✔ The Vertical asymptote
- ✔ The horizontal asymptote
- ✔ The Slant Asymptote
- ✔ As $x \to -\infty$ , $y \to ?$ and As $x \to \infty$ , $y \to ?$
- ✔ As $x \to 0^-$ , $y \to ?$ and As $x \to 0^+$ , $y \to ?$
- ✔ The x-intercept/s
- ✔ The y-intercept/s

## IV. **Logarithms**

**Use the properties of logarithms to evaluate each of the following without the use of a calculator.**

1) $\log_8 1$
2) $\log_2 \frac{1}{8}$
3) $\log_6 36$
4) $\log_4 8$
5) $\ln \sqrt{e}$
6) $\log_3 3^7$
7) $\log_4 \sqrt[5]{16}$
8) $8 \ln e^4$

**Use the properties of logarithms to expand each of the following with only linear factors.**

9) $\log_3 x\sqrt{y}$

10) $\log_7 \dfrac{x+5}{x-3}$

11) $\log_2 \dfrac{x^2+11x+30}{x+4}$

12) $\log_3 \sqrt[5]{\dfrac{x^2+10x+25}{x(x+4)}}$

13) $\log_6 \dfrac{\sqrt[7]{x^2-4}}{(x+6)^{\frac{3}{5}}}$

14) $\log_b \dfrac{\sqrt{x^3(x+3)}}{x-1}$

15) $\ln \sqrt[3]{\dfrac{x^5}{(x+4)(x-2)}}$

## V. Trigonometry

**Evaluate. Find the exact value. Do not use a calculator. Use special triangles and the concept of Reference angles.**

1) $\sin\dfrac{7}{2}\pi - \tan\dfrac{\pi}{4}$

2) $\cos\pi - \sin\dfrac{15}{2}\pi$

3) $\cos 60^0 - \sin 30^0$

4) $\cos 60^0 + \sin 30^0$

5) $\tan\frac{\pi}{3}$

6) $\sin\left(-\frac{\pi}{6}\right)$

7) $\cos\left(-\frac{4\pi}{3}\right)$

8) $\cot\left(\frac{11\pi}{4}\right)$

9) $\cot\left(\frac{11\pi}{4}\right)-\tan\left(\frac{3}{4}\pi\right)$

Complete each of the following using trigonometric identities and formulas.

10) $\sin\left(\frac{\pi}{2}-x\right)$

11) $\cos\left(-\frac{\pi}{6}\right)$

12) $\tan 2u$

Solve the equations. Find all solution on $[0,2\pi)$ and the expression for the general solution.

13) $2\sin x-1=0$

14) $2\cos x+\sqrt{3}=0$

15) $4\tan^2 x-12=0$

16) $2\cos^2 x-1-\cos=0$