

AP Calculus Summer Assignment

- Equations of lines – Write the equation of the line with the given characteristics. Your answer can be in slope-intercept, point-slope, or standard form.
 - Vertical line through $(3, 2)$
 - Slope -2 through $(-1, 3)$
 - Slope $\frac{3}{5}$ through $(5, 0)$
 - Through $(1, 2)$ and $(-1, -1)$
 - Parallel to $2x + y = 4$ through $(-2, 2)$
 - Perpendicular to $2x + y = 4$ through $(-2, 2)$
- Domain/Range – Identify the domain and range of each function.
 - $f(x) = 1$
 - $f(x) = (x - 1)^2$
 - $f(x) = \sqrt{x - 1}$
 - $f(x) = \frac{1}{x+1}$
 - $f(x) = \sin x$
- Composite Functions
 - Given $f(x) = x - 1$ and $g(x) = x^2 + 2$, evaluate:
 - $f(g(-3))$
 - $g(f(3))$
 - $f(g(x))$
 - $(g \circ f)(x)$
 - Each function is written in the form $(f \circ g)(x)$. Identify $f(x)$ and $g(x)$.
 - $\cos(3x)$
 - $(x + 3)^2$
 - e^{2x-1}
 - $\ln(x^2 - 3x + 5)$
- Inverse Functions – Given $f(x)$, find $f^{-1}(x)$.
 - $f(x) = 2x + 3$
 - $f(x) = \frac{1}{x^3}$
 - $f(x) = \frac{x+3}{x-2}$
 - $f(x) = e^x$
- Piecewise Functions –
 - Given $f(x) = \begin{cases} 3 - x, & x \leq 1 \\ 2x, & x > 1 \end{cases}$
 - Evaluate $f(-2)$, $f(1)$, and $f\left(\frac{5}{2}\right)$.
 - Graph $f(x)$.

b. Given $g(x) = \begin{cases} 4 - x^2, & x < 1 \\ \frac{3}{2}x + \frac{3}{2}, & 1 \leq x \leq 3, \\ x + 3, & x > 3 \end{cases}$

- i. Evaluate $g(2)$, $g(0)$, and $g(3)$.
- ii. Graph $g(x)$.

6. Degree-Radian Conversion – *Convert the following degree measures to radians.*

- a. 90°
- b. 240°
- c. -60°
- d. 135°
- e. -270°

7. Evaluate Trig Functions – *Evaluate the following expressions. All measures are in radians. Give exact values (no decimals).*

- a. $\sin\left(\frac{3\pi}{2}\right)$
- b. $\tan\left(\frac{11\pi}{6}\right)$
- c. $\cos\left(\frac{5\pi}{6}\right)$
- d. $\cos(2\pi)$
- e. $\sin\left(\frac{7\pi}{4}\right)$
- f. $\tan\left(\frac{4\pi}{3}\right)$

8. Log/Exponent Rules

a. *Write the following as a single log.*

- i. $2 \ln 5 - 3 \ln 2$
- ii. $\ln 3 + 5 \ln 2$
- iii. $2 \ln a - 5 \ln b + \ln c$

b. *Write the following as a single power with positive exponents.*

- i. $(x^3 \cdot x^{-5})^{-2}$
- ii. $\frac{2^x \cdot 2^y}{2^z}$
- iii. $(e^2 \cdot e^3)^{1/2}$

9. Log/Exponent Equations – *Solve each equation for x .*

- a. $e^x = 2$
- b. $e^{0.05x+2} = 3$
- c. $2 \ln x = 3$
- d. $3 \ln(x - 2) = 9$