

## 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.  $90^\circ$
- b.  $240^\circ$
- c.  $-60^\circ$
- d.  $135^\circ$
- e.  $-270^\circ$

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.  $3 \ln(x - 2) = 9$