

## AP Calculus AB Summer Review Assignment

There are certain skills that have been taught to you over the previous years that are essential to your success in AP Calculus AB. If you do not have these skills, you will find that you may get problems incorrect next year, even though you may understand the calculus concepts. It can be frustrating for students when they are tripped up by the algebra or trigonometry and not the calculus. This summer packet is intended for you to retain/review/relearn these topics.

**Due Date:** First day of school

To earn full credit: Work must be clearly numbered and in consecutive order on separate paper. Each problem must have work. No work... no credit! Sections 1-9 should be completed without a calculator. Section 10 requires a graphing calculator. If you have any questions during the summer, I can be reached at [slossk@duvalschools.org](mailto:slossk@duvalschools.org).

### 1. Simplify each.

a.  $\frac{2x^2 - x - 3}{x + 1}$

b.  $\frac{x^2 - 5x + 4}{x^2 - 2x - 8}$

c.  $\frac{x^2 + 3x}{9 - x^2}$

d.  $\frac{\sin 2x}{\sin x}$  (Use double angle...)

e.  $\sin^2 x + \cot^2 x \sin^2 x$

f.  $\frac{\sin^2 x + \sin x - 6}{\sin x + 3}$

g.  $\frac{1}{x} - \frac{1}{x + 2}$

h.  $\frac{2x}{x - 1} + \frac{4}{x^2 - 4x + 3}$

i.  $\frac{x - \frac{1}{x}}{x + \frac{1}{x}}$

j.  $-5\left(\frac{3}{2}\right)(4 - 9x)^{\frac{1}{2}}(-9)$

### 2. Factor completely.

a.  $x^5 + 11x^3 - 80x^2$

b.  $2x^2 + 50y^2 - 20xy$

c.  $4x^3 - 8x^2 - 25x + 50$

### 3. Solve for m.

a.  $2x + 8ym = 0$

b.  $m = (y + xm)(1 + y)$

c.  $m \cos x + m \sin x = \cos 2x$

### 4. Using point slope form, write the equation for the line:

a. with slope of -2, containing the point (4,3)

b. containing the points (1,2) and (-6,7)

c. parallel to  $3x - 2y = 7$  passing through (4,1)

d. perpendicular to  $3x - 2y = 7$  passing through (4,1)

### 5. Solve for x without a calculator.

a.  $x^2 - 7 = 2x + 8$

b.  $4x^2 - 9 = 0$

c.  $(x + 3)^2 = 16$

d.  $3x^2 + 10x = 8$

e.  $\cos x - \sin x = 0, 0 \leq x < 2\pi$

f.  $2 \sin x \cos x + \sin x = 0, 0 \leq x < 2\pi$

g.  $\cos 2x = \sin x, 0 \leq x < 2\pi$

h.  $e^{2x} = 5$

i.  $\ln 3x = -2$

### 6. Sketch the graph without a graphing calculator. Identify all intercepts, domain, and range.

a.  $y = x^3 - 2x^2 - 3x$

b.  $y = x^2 + 3x - 10$

c.  $y = e^x + 3$

d.  $y = \ln(x - 1)$

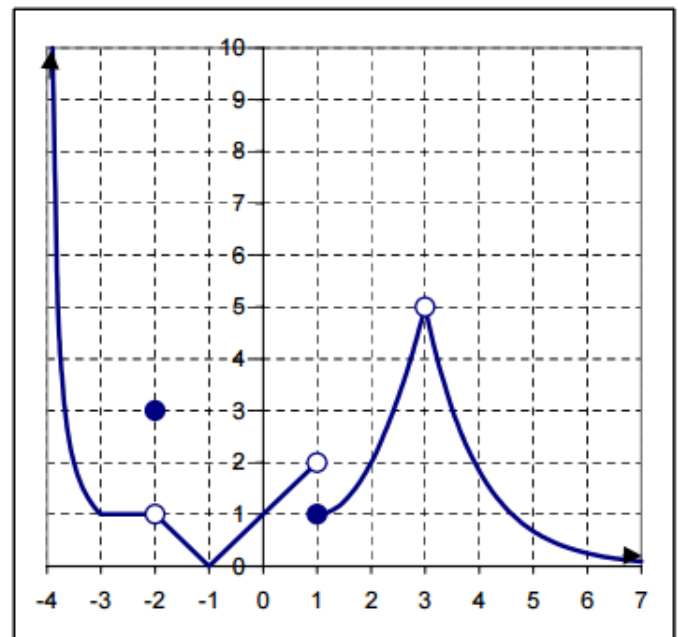
e.  $y = \sqrt{x + 2} - 1$

f.  $y = \sqrt{9 - x^2}$

g.  $y = \begin{cases} x + 1 & x < 0 \\ x^2 - 1 & 0 \leq x \leq 2 \\ -x + 3 & x > 2 \end{cases}$

7. Follow the directions for each question.

- Given  $f(x) = 2|x+1| - 3$ , find  $f(0) - f(4)$
- Given  $f(x) = x^2 + 2x$ , find  $f(x+3)$  and  $f(x+h)$ .
- Rationalize the denominator:  $\frac{2}{\sqrt{3} + \sqrt{2}}$
- Rationalize the denominator:  $\frac{1 - \sqrt{5}}{1 + \sqrt{3}}$
- Find the domain:  $f(x) = \frac{\sqrt{x+1}}{x-3}$
- Find the domain:  $g(x) = \frac{3x+1}{\sqrt{x^2+x-2}}$



8. Find the equations of all vertical and horizontal asymptotes (if they exist).

- $y = \frac{x}{x+3}$
- $y = \frac{x+4}{x^2-1}$
- $y = \frac{x^2-9}{x^3+3x^2-18x}$

9. Find each limit.

- $\lim_{x \rightarrow -1} \frac{x^2 - 1}{x + 1}$
- $\lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x - 3}$
- $\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x - 3}$
- $\lim_{x \rightarrow 4} \frac{3}{x - 4}$
- $\lim_{x \rightarrow -1} \frac{2x^2 - x - 3}{x + 1}$
- $\lim_{x \rightarrow -2} f(x), f(x) = \begin{cases} -x^2 + 4, & x > -2 \\ 3x + 6, & x < -2 \end{cases}$

Using the graph above, find each of the following:

- |    |                                  |                                 |
|----|----------------------------------|---------------------------------|
|    | $\lim_{x \rightarrow -2^-} f(x)$ | $\lim_{x \rightarrow 1^-} f(x)$ |
|    | $\lim_{x \rightarrow -2^+} f(x)$ | $\lim_{x \rightarrow 1^+} f(x)$ |
| g. | $\lim_{x \rightarrow -2} f(x)$   | $\lim_{x \rightarrow 1} f(x)$   |
|    | $f(2)$                           | $f(1)$                          |

10. A graphing calculator is **REQUIRED** for AP Calculus AB. Please complete the following questions using the graphing calculator that you plan on using during class.

- Given  $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$ , find all x-intercepts.
- Given  $f(x) = 3\sin 2x - 4x + 1$ , find all roots from  $[0, 2\pi)$ .
- Given  $f(x) = x^4 - 8x^2 + 5$ , find all x-intercepts.
- Given  $f(x) = |x-3| + |x| - 6$ , find all x-intercepts.
- Given  $f(x) = 100x^3 - 203x^2 + 103x - 1$  find all roots, minimums, and maximums.
- Where do the graphs of  $f(x) = 0.5x$  and  $g(x) = \sin 2x$  intersect?