

# AP Calculus 2019-2020

## Summer Assignment

Welcome to Advanced Placement Calculus. This summer assignment will help you review key concepts from pre-calculus so we can hit the ground running when we return to school in August. This assignment will be due Thursday August 15 at the beginning of class.

If you need to contact me over the summer, my email is [astagner@pasco.k12.fl.us](mailto:astagner@pasco.k12.fl.us). My phone number is 727-597-3256.

(Assignment begins on page 2.)

## ON YOUR OWN PAPER

1. Factor out monomial factors.

(A)  $3x^4 + 4x^3 - x^2 = x^2(\quad)$

(E)  $\frac{x}{2} - 6x^2 = x(\quad)$

(B)  $2\sqrt{x} + 6x^{3/2} = x^{1/2}(\quad)$

(F)  $\sin x + \tan x = \sin x(\quad)$

(C)  $e^{-x} - xe^{-x} + 2x^2e^{-x} = e^{-x}(\quad)$

(G)  $\frac{1}{2x^2 + 4x} = \frac{1}{x}(\quad)$

(D)  $x^{-1} - 2 + x = x^{-1}(\quad)$

2. Factor these.

(A)  $x^3 - 27 =$

(B)  $x^4 - 25 =$

3. Factor completely by grouping.

(A)  $x^3 + 4x^2 - 2x - 2x - 8 =$

(B)  $x^3 + 2x^2 + 3x + 6 =$

4. Use synthetic division to factor.  $\frac{p}{q}$

(A)  $x^3 - 4x^2 + 2x + 1 =$

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

(C)  $4x^4 + 3x^2 - 1 =$

5. Factor as indicated. DO NOT MULTIPLY THESE OUT

(A)  $(x-1)^2(x) - (x-1) =$

(B)  $3(x^2 + 4)(x^2 + 1) + 6(x^2 + 4)^2 =$

(C)  $\sqrt{x^2 + 1} - \frac{x^2}{\sqrt{x^2 + 1}} =$

(D)  $(x - 3)^3(x + 2) - 2(x - 3)^2(x + 2)^2 =$

(E)  $(2x + 1)^{\frac{3}{2}}(x^{\frac{1}{2}}) + (2x + 1)^{\frac{5}{2}}(x^{-\frac{1}{2}}) =$

6. Reduce each expression to lowest terms.

(A)  $\frac{3x + 9}{6x}$

(D)  $\frac{x^{\frac{1}{2}} - x^{\frac{1}{3}}}{x^{\frac{1}{6}}}$

(B)  $\frac{x^2}{x^{\frac{1}{2}}}$

(E)  $\frac{\sqrt{x - 1} + (x - 1)^{\frac{3}{2}}}{\sqrt{x - 1}}$

(C)  $\frac{(x + 1)^3(x - 2) + 3(x - 1)^2}{(x + 1)^4}$

(F)  $\frac{1 - (\sin x + \cos x)^2}{2 \sin x}$

7. Solve using the quadratic formula (if you don't remember this, use a lifeline—call a friend).

Equation

solve for

(A)  $x^2 - 4x - 1 = 0$

x

(B)  $2x^2 + x - 3 = 0$

x

8. Factor these quadratic expressions.

(A)  $x^2 - 3x + 2 =$

(B)  $x^2 - 9 =$

(C)  $x^2 + 5x - 6 =$

(D)  $x^2 + 5x + 6 =$

(E)  $2x^2 + 5x - 3 =$

(F)  $e^{2x} + 2 + e^{-2x} =$

(G)  $x^4 - 7x^2 + 12 =$

(H)  $1 - \sin^2 x =$

9. Factor these polynomials completely.

(A)  $x^3 - 2x^2 - 5x + 6 =$       (B)  $2x^3 - 17x^2 + 9x - 8 =$

(C)  $4x^4 - 7x^2 - 5x - 1 =$       (D)  $3x^3 - x^2 - 22x + 24 =$

10. Simplify (your life) and these expressions.

(A)  $\frac{(x-1)(x+3) - (x+1)^2}{x+1}$

(D)  $\frac{1}{x+1} - \frac{1}{x-1} - \frac{2}{x^2-1}$

(B)  $\frac{\sqrt{x^2+1} - \left(\frac{1}{\sqrt{x^2+1}}\right)}{x^2+1}$

(E)  $\frac{x(-2x)}{2\sqrt{1-x^2}} + \sqrt{1-x^2} + \frac{1}{\sqrt{1-x^2}}$

(C)  $\frac{x^2 - 5x + 6}{x^2 - 4x + 4}$

11. Rational the denominator. Use a conjugate.

(A)  $\frac{1}{1 - \cos x}$

(C)  $\frac{2}{x + \sqrt{x^2 + 1}}$

(B)  $\frac{x}{1\sqrt{x^2 + 1}}$

## Graphing Worksheet

It is important to be able to visualize mentally the graphical image of a function when given an algebraic description.

Without your calculator, graph each function. Clearly label the units. Be able to identify key points and domain and range.

1.  $f(x) = x$

2.  $f(x) = x^2$

3.  $f(x) = x^3$

4.  $f(x) = |x|$

5.  $f(x) = [x]$

6.  $f(x) = \sin x$

7.  $f(x) = \cos x$

8.  $f(x) = \tan x$

9.  $f(x) = \sec x$

10.  $f(x) = e^x$

11.  $f(x) = \ln x$

12.  $f(x) = \frac{1}{x}$

13.  $f(x) = \frac{1}{x^2}$

14.  $f(x) = \sqrt{x}$

15.  $f(x) = \sqrt{a^2 - x^2}$

You must know the unit circle inside out and backwards. We use radians almost all the time in calculus so focus on that.

