Review of Precalculus topics for AP Calculus

I. Trigonometry.

1. Define the six trig functions using x, y, and r.

2. Sketch the graphs of $y = \sin\theta$, $y = \cos\theta$, and $y = \tan\theta$ on the interval $-2\pi \le x \le 2\pi$ WITHOUT a calculator. Identify the period for each graph, and label the nine critical points.

3. Find the values of $\sin\theta$, $\cos\theta$, and $\tan\theta$ for the following quadrantal angles. (I expect you to be able to find these WITHOUT a calculator, by using the graphs of $y = \sin\theta$, $y = \cos\theta$, $y = \tan\theta$ OR the unit circle)

a) $0°$

b) $90°$

c) $180°$

d) $\frac{3\pi}{2}$

e) 2π

4. Find the values of the six trig functions for the following special angles. (those with a reference angle of $30°$, $45°$, and $60°$) Do this by sketching one of the special triangles and using the opposite, adjacent, hypotenuse definitions.

a) $\frac{2\pi}{3}$

b) $\frac{7\pi}{6}$

c) $\frac{7\pi}{4}$

5. Complete the following identities:

a) $\sin^2 x +$ _____ $= 1$

b) $\sin 2x =$ _____

c) $1 + \cot^2 x =$ _____

d) _____ $+ 1 = \sec^2 x$

II. Functions.

6. Find the domain and range for the following functions, and tell whether they are odd, even or neither. (A sketch of the graph will help!)

a) $y = x^2 + 2$

b) $y = x^3$

c) $y = |x|$

d) $y = \sqrt{x}$

e) $y = \dfrac{x^2 + 1}{x - 1}$

f) $y = e^x$

g) $y = \dfrac{1}{x}$

7. Find the vertical and horizontal asymptotes for the following functions.

a) $f(x) = \dfrac{x - 2}{2x^2 + 3x - 5}$

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

8. Solve for x. NO CALCULATOR.

a) $24 = e^{x+1}$

b) $4^{2x-1} = 16$

c) $\log_4 x = \dfrac{3}{2}$

d) $x^2 + 3x - 4 = 0$

e) $x^3 - 6x^2 + 11x - 6 = 0$

f) $x^3 - 27x + 10 = 0$

g) $x^2 + 3x + 1 = 0$

III. Limits and Continuity.

9. Evaluate the limits (if they exist).

a) $\lim_{x\to 2} 2x$

b) $\lim_{x\to -1} 3x(2x-1)$

c) $\lim_{x\to 1}\left(x^3+3x^2-2x-17\right)$

d) $\lim_{x\to 1}\dfrac{x-1}{x^2-1}$

e) $\lim_{x\to -5}\dfrac{x^2+3x-10}{x+5}$

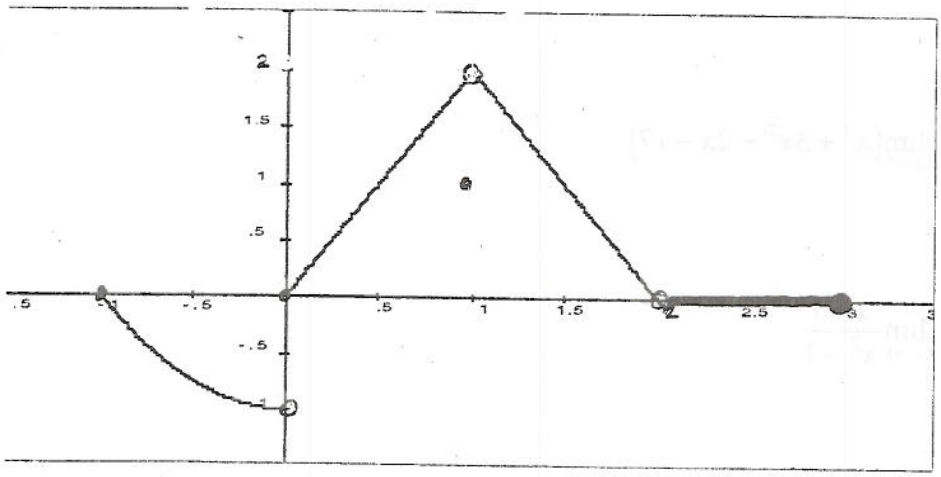
f) $\lim_{x\to 0}\dfrac{1}{x^2}$

g) $\lim_{x\to\infty}\dfrac{2x+3}{5x+7}$

h) $\lim_{x\to 2^+}\dfrac{x}{x-2}$

10. Use the graph of f(x) to answer the following questions.

$$f(x)=\begin{cases} x^2-1, & -1\le x<0; \\ 2x, & 0\le x<1; \\ 1, & x=1; \\ -2x+4, & 1<x<2; \\ 0, & 2<x\le 3. \end{cases}$$



a) Does f (1) exist?

b) Does $\lim_{x\to 1} f(x)$ exist?

c) Does $\lim_{x\to 1} f(x) = f(1)$?

d) Is f (x) continuous at x = 1 ?

e) What is the value of $\lim_{x\to 2} f(x)$?

f) On what intervals of x values is f (x) continuous?

g) Are there any points of discontinuity in f (x) that are removable? (HINT: A point of discontinuity is removable when it can be made continuous by moving a single point in the plane.)