Calculus 1 (AP, Honors, Academic)
Summer Assignment 2018

The summer assignments for Calculus will reinforce some necessary Algebra and Precalculus skills. In order to be successful in Calculus, you must have certain prerequisite skills mastered. The Unit Circle for special angles must be memorized.

You will be tested on the topics listed below. You will not be permitted to use a calculator during the test. Complete this practice over the summer. I recommend doing four problems each day. There are 169 problems.

Show your work on looseleaf and graph paper. The packet will be collected on the first day of school. Be sure that your work is neat, well-organized and complete. You are encouraged to use any and all resource materials available to you such as your notebooks from previous math courses, math textbooks found in the public and college libraries, and the Internet. **As you complete the review exercises, you are preparing for the first test of the first quarter.**

Calculus 1 (AP, Honors, Academic)
Summer Assignment 2016
Part 1

Simplify

1. $(x^3 + x + 1)(4x^3 + 2x) + (x^4 + x^2 + 1)(3x^2 + 1)$

2. $\frac{(3x-2)(2)-(2x+5)(3)}{(3x-2)^2}$

Rewrite in factored form

3. $-2x(1 - x)(1 + x^2)^{-2} - (1 + x^2)^{-1}$

4. $8x^3(2x - 5)^3 + (2x - 5)^4(3x^2)$

5. $-x^2(1 + x^2)^{-3/2} + (1 + x^2)^{-1/2}$

Solve for z in terms of x and y

6. $2x - (xz + y) + 2yz = 0$

7. $x^2z + 2xy + 2xyz + y^2 = 0$

8. $3x^2 + 3y^2z = 18xz + 18$

9. $12x + 3xz + 3y + 4yz + 17z = 0$

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Summer Assignment Part 2

Solve the following. Express answers as integers, simplified fractions, or simplified radicals. If no answer exists, explain why in sentence form.

Find the vertical asymptote of each function.

A vertical asymptote of a rational function occurs at a domain value (x-value) where the denominator is zero and the numerator is not zero.

1. $f(x) = \dfrac{1}{x^2 - 9}$

2. $f(x) = \dfrac{x^2}{x^2 - 9}$

3. $f(x) = \dfrac{x^2 - 2}{x^2 - x - 2}$

4. $f(x) = \dfrac{x^2 - 4}{x^2 - x - 2}$

5. $f(x) = \dfrac{x^3 + 1}{x + 1}$

6. $f(x) = \dfrac{x^3 + 1}{x^2 - 1}$

7. $f(x) = \dfrac{x^3 + 1}{x^2 + 1}$

8. $f(x) = \dfrac{x}{\sin x}$

9. $f(x) = \dfrac{1}{\sin 2x}$

10. $f(x) = \tan 2x$ (Remember the Quotient Property of trig functions)

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Summer Assignment Part 3

Solve the following. Express answers as integers, simplified fractions, or simplified radicals. If no answer exists, explain why in sentence form.

Find the values of x that make the functions equal zero.

1. $f(x) = 4x^3 - 16x$

2. $f(x) = 3x^2 + 1$

3. $f(x) = \frac{-2}{x^3}$

4. $f(x) = 1 + \cos x$ for $0 \le x \le 2\pi$

5. $f(x) = \sqrt{3} - 2\sin x$ for $0 \le \text{x} \le 2\pi$

6. $f(x) = \sqrt{3} - 2\sin 2x$ for $0 \le \text{x} \le 2\pi$

7. $f(x) = 4 - \sec^2 x$ for $0 \le \text{x} \le 2\pi$

8. $f(x) = \sec^2 x - \sec x \tan x$ for $0 \le \text{x} \le 2\pi$

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Summer Assignment Part 4

Solve the following. Express answers as integers, simplified fractions, or simplified radicals. If no answer exists, explain why in sentence form.

Find the values of x where (a) the function equals zero and (b) the function is undefined.

1. $f(x) = 3x^2 - 6x$

2. $f(x) = 2\sin x \cos x - \sin x$ for $0 \le x \le 2\pi$

3. $f(x) = \dfrac{x^2 + 2x - 3}{x^2 + 2x + 1}$

4. $f(x) = 2\cos x - 2\sin 2x$ for $0 \le x \le 2\pi$

5. $f(x) = \dfrac{4 - 2x^2}{\sqrt{4 - x^2}}$

Calculus 1 (AP, Honors, Academic) Part 5 NO CALCULATOR:

(1) Simplify, if possible:

(a) $2x+8$ (b) $\dfrac{5x^2+15x}{10x^4+30x}$ (c) $\dfrac{8x-3}{4x+2}$ (d) $\dfrac{x^2-x-6}{x^2-4x+3}$

(2) Solve for *x*:

(a) $7(-2x+3)=14$

(b) $6x-10=-4x+40$

(c) $3x^2=-15x$

(d) $2x^2-17x=9$

(e) $\ln x=5$

(f) $\log_4(x+3)=2$

(g) $e^x=10$

(h) $5^{3x}-1=3$

(i) $3e^{2x}=50$

(j) $\sqrt{x^2-17}=x-1$

(k) $\sqrt{4+x}+0.5x(4+x)^{-1/2}=0$

(l) $x^2e^{-x}-2xe^{-x}=0$

(m) $2x^3-4x^2+5x+3=x^3+x^2+19x+3$

(n) $|2x-3|=7$

(o) $-\dfrac{1}{x+2}=\dfrac{1}{2}+\dfrac{1}{3}$

(p) $\dfrac{3}{x-5}+\dfrac{2}{x+1}=\dfrac{6}{x^2-4x-5}$

(q) $\dfrac{x^2-5}{2x+1}=0$

(3) Using your knowledge of the unit circle, evaluate:

(a) $\sin \pi$ (b) $\sin 0$ (c) $\sin \frac{3\pi}{2}$ (d) $\sin \frac{\pi}{3}$ (e) $\sin \frac{5\pi}{4}$

(f) $\cos 0$ (g) $\cos \frac{\pi}{2}$ (h) $\cos \pi$ (i) $\cos \frac{\pi}{6}$ (j) $\cos \frac{5\pi}{3}$

(k) $\tan 0$ (l) $\tan \frac{\pi}{2}$ (m) $\tan \frac{3\pi}{2}$ (n) $\tan \frac{\pi}{4}$ (o) $\tan \frac{5\pi}{6}$

(p) $\csc 0$ (q) $\csc \frac{\pi}{6}$ (r) $\sec 0$ (s) $\sec \frac{\pi}{4}$ (t) $\cot \frac{\pi}{2}$ (u) $\cot \frac{7\pi}{4}$

(v) $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$ (w) $\cos^{-1} 0$ (x) $\sec^{-1} 1$

(4) Simplify the following trig expressions:

(a) $\sin x \cot x$ (b) $\tan x \csc x \cos x$ (c) $\frac{\sin^2 x}{\csc^2 x}$

(d) $\sec x \sin x \cos x$

(5) Simplify without any negative exponents in the final answer:

(a) $x^2 \bullet x^7$ (b) $4x^{-3} \bullet x$ (c) $(3x^5 y^{-4})(5x^{-8} y^9)$

(d) $\frac{x^{10}}{x^4}$ (e) $\frac{x^{-3}}{x^7}$ (f) $\frac{-8x^4 y^3}{4x^6 y}$

(g) $(x^2)^5$ (h) $\left(\frac{x^6}{y^{-2}}\right)^{-1}$ (i) $(9x^4)^3$

(j) $x^0 y^7$ (k) $\left(\frac{512\sqrt{x}}{x^7} - \sin x\right)^0$

(6) Rewrite in exponential form: (a) $\sqrt[3]{x}$ (b) $\sqrt[5]{x^2}$

(7) Rewrite in radical form: (a) $x^{1/2}$ (b) $x^{-3/4}$

(8) Simplify: (a) $\sqrt{64x^2 y^{10}}$ (b) $\sqrt{\frac{16x^4}{100}}$

(9) Sketch the following equations as accurately as you can. Use your knowledge of the transformation rules.

(a) $y = 4x - 2$ (b) $y = 7$ (c) $x = -3$

(d) $y = x^2$ (e) $y = x^2 + 3$

(f) $y = x^3$ (g) $y = (x+2)^3$

(h) $y = \ln x$ (i) $y = \ln x - 4$

(j) $y = \sin x$ (k) $y = \sin\left(x - \frac{\pi}{2}\right)$

(l) $y = e^x$ (m) $y = -e^x$ (n) $y = e^{-x}$

(o) $y = \cos x$ (p) $y = 2\cos x$ (q) $y = \frac{1}{2}\cos x$

(r) $y = |x|$ (s) $y = |4x|$ (t) $y = \left|\frac{1}{4}x\right|$

(u) $y = \begin{cases} 3x, & x < 0 \\ x^2, & x \geq 0 \end{cases}$ (v) $y = \begin{cases} 2x+3, & x > 1 \\ 5, & x = 1 \\ x^3, & x < 1 \end{cases}$

(10) Rewrite in exponential form: (a) $\log_3 9 = 2$ (b) $\log_4 \frac{1}{16} = -2$

(11) Rewrite in logarithmic form: (a) $5^x = 20$ (b) $2^{-3} = \frac{1}{8}$

(12) Evaluate:

(a) $\log_4 4$ (b) $\log_5 1$ (c) $\log \frac{1}{10}$

(d) $\ln e$ (e) $\ln 1$ (f) $\ln \frac{1}{e}$ (g) $\ln e^2$

(13) Simplify, if possible:

(a) $\ln 8 + \ln 5$ (b) $\ln 20 + \ln \frac{1}{2}$ (c) $\ln 12 - \ln 4$ (d) $\ln 500 - \ln 20$

(e) $\dfrac{\ln 15}{\ln 3}$ (f) $(\ln 2)(\ln 6)$ (g) $e^{\ln(x+3)}$ (h) $\ln e^{\sin x}$

(i) $e^{-2\ln x}$

(14) Rewrite without an exponent: $\ln x^3$

(15) Rewrite using an exponent: $-\ln 2$

(16) If you could use a calculator, how would you evaluate the following problems?

(a) $\log_7 40$ (b) $\log_5 0.27$

(17) Are the following expressions defined? Indicate "yes" or "no."

(a) $\dfrac{17}{5+3-8}$ (b) $\dfrac{6x}{x+3}$ $when\ x = 0$ (c) $\dfrac{x^2}{x-5}$ $when\ x = 5$

(d) $\sqrt{x-10}\ when\ x = 14$ (e) $\sqrt{x-8}\ when\ x = 8$ (f) $\sqrt{x-1}\ when\ x = 0$

(g) $\ln 1$ (h) $\ln 0$ (i) $\ln(-3)$

(18) Indicate if the following statements are "true" or "false."

(a) The graph of $y = \dfrac{x^2-4}{x+2}$ is equivalent to the graph of $y = x-2$.

(b) The solutions for $3x^3 = 14x^2$ are the same as those for $3x = 14$.

(c) The graph of $y = \sqrt{x^2}$ is equivalent to the graph of $y = x$.

(19) Given that $f(x) = x^2 + 3x$ **and** $g(x) = \sin x$, **determine:**

(a) $f(7)$ (b) $g(\pi)$ (c) $f\left(g\left(\dfrac{3\pi}{2}\right)\right)$ (d) $f(g(x))$

(e) $g(f(x))$ (f) $f(f(x))$ (g) $f(x+c)$

(h) $h(1)\ where\ h(x) = f^2(x+1)$

(i) $j(\pi)\ where\ j(x) = \sqrt{f(g(x)+2)}$