Name _____

Calculus Summer Packet

Going into Calculus, there are certain skills that you have been taught to you over the previous years that I assume you have. If you do not have these skills, you will consistently get problems incorrect next year, not because you don't understand the Calculus but because you have forgotten the Algebra involved. The topics covered in the packet are skills that are used continually in Calculus.

The packet is due the first day of school. Do not fake your way through these problems. All work is to be shown. If you need extra paper, use it. Do not rely of sites such as Mathway, Symbolab, or other sites that provide the answers. Use sites like Khan Academy to (re)learn the content.

1. Are the following statements true? If not, explain why.

a. $\frac{3a}{3a+h}=\frac{a}{a+h}$

b. $\frac{1}{x+y}=\frac{1}{x}+\frac{1}{y}$

c. $\frac{x+y}{2}=\frac{x}{2}+\frac{y}{2}$

d. $5\left(\frac{x}{y}\right)=\frac{5x}{5y}$

e. $5\left(\frac{a+b}{c}\right)=\frac{5a+b}{c}$

2. Simplify:

a. $\frac{\frac{x}{2}}{\frac{y}{4}}=$

b. $h\div\frac{x+h}{h}=$

c. $\frac{\sqrt{x-2}+\frac{5}{\sqrt{x-2}}}{x-2}=$

3. Solve for y': $xy'+y=1+y'$

4. Find the average rate of change on the indicated intervals:

a. $f(x)=x^3-2x;\ [0,4]$

b. $f(x)=3\sqrt{x};\ [4,\ 25]$

10. Determine if the function is *even, odd, or neither.*

a. $f(x) = 2x^2 - 7$

b. $f(x) = -4x^3 - 2x$

c. $f(x) = 4x^2 - 4x + 4$

11. Find the equation of the straight line that passes through the point (2, 4) and is

a. Parallel to $2x - 3y - 8 = 0$

b. Perpendicular to $2x - 3y - 8 = 0$

12. Given $f(x) = |x - 3| - 5$ find f(1) – f(5)

13. Given $f(x) = x^2 - 3x + 4$, find f(x +2) – f(2)

14. Find the domain for each function:

a. $f(x) = \dfrac{1}{4x^2 - 21x - 18}$

b. $g(x) = \sqrt{x^2 - 5x - 14}$

c. $h(x) = \dfrac{\sqrt[3]{x-6}}{\sqrt{x^2 - x - 30}}$

d. $k(x) = \ln(2x - 12)$

19. *Given* $f(x)=x-3$ *and* $g(x)=\sqrt{x}$, *find the following*

a. f(g(x))

b. g(f(x))

c. f(f(x))

20. Given $f(x)=\frac{1}{x-5}$ *and* $g(x)=x^2-5$, find the following:

a. f(g(7))

b. g(f(v))

c. g(g(x))

21. Let f(x)=2x-2, find $f^{-1}(x)$

22. Simplify using only positive exponents. Do not rationalize the denominator.

a. $\frac{\sqrt{4x-16}}{\sqrt[4]{(x-4)^3}}$

b. $\left(\frac{1}{x^{-2}}+\frac{2}{x^{-1}y^{-1}}+\frac{1}{y^{-2}}\right)^{-\frac{1}{2}}$

27. Finish the factoring

a. $2\sqrt{x}+6x^{\frac{3}{2}} = 2\sqrt{x}(\ ?\ )$

b. $\sqrt{x^2+1}-\dfrac{x^2}{\sqrt{x^2+1}} = \dfrac{1}{\sqrt{x^2+1}}(\ ?\ )$

c. $(2x+1)^{\frac{3}{2}}x^{\frac{1}{2}}+(2x+1)^{\frac{5}{2}}x^{-\frac{1}{2}} = (2x+1)^{\frac{3}{2}}x^{-\frac{1}{2}}(\quad ?\quad)$

28. A 7 foot ladder, leaning against a wall, touches the wall x feet above the ground. Write an expression in terms of x, for the distance from the foot of the ladder to the base of the wall.

29. Evaluate without a calculator: (all angles are in radians)

a. $\cos 0$ b. $\sin 0$ c. $\tan\dfrac{\pi}{2}$ d. $\cos\dfrac{\pi}{4}$

e. $\sin\dfrac{\pi}{2}$ f. $\sin\pi$ g. $\arccos\dfrac{\sqrt{3}}{2}$ h. $\arctan 1$

i. $\sec(\arctan 2)$ j. $\arctan(-1)$ k. $\cos\pi$ l. $\csc\dfrac{\pi}{6}$

34. *If* $x = 2\cos^2\theta$ *and* $y = \sin 2\theta$, *show that* $(x-1)^2 + y^2 = 1$

35. Evaluate

Let $x_1 = 6$, $x_2 = 8$, $x_3 = 9$, *and* $x_4 = 13$

a. *Evaluate* $m = \dfrac{\sum_{i=1}^{4} x_i}{4}$

b. *Evaluate* $\dfrac{\sum_{i=1}^{4} (x_i - m)^2}{4}$

36. a. Solve to the nearest thousandth:

1. $4^x = 3$

2. $\ln x = 1.09$

b. Express y in terms of x:

1. $\log y = x + 2$

2. $\ln y = 2\ln x$

3. $\ln y = 4\ln x + 3$