Summer work for Honors Calculus 2021 Name_____

This packet contains problems involving skills that you should already know. Please take your time with these problems and SHOW YOUR WORK. Do not use a calculator unless otherwise noted. Use online resources to help you if forget how to work out a problem.

This packet is due August 27, 2021.

Feel free to email ehanuska@yorkcatholic.org if you have questions while completing this packet.

A. Simplify. Show the work that leads to your answer.

1) $\dfrac{x-4}{x^2-3x-4}$

2) $\dfrac{x^3-8}{x-2}$

3) $\dfrac{5-x}{x^2-25}$

4) $\dfrac{x^2-4x-32}{x^2-16}$

B. Simplify each expression in order to obtain a single fraction. Show all work.

1) $\dfrac{1}{x+h}-\dfrac{1}{x}$

2) $\dfrac{\dfrac{2}{x^2}}{\dfrac{10}{x^5}}$

3) $\dfrac{2}{1+a^2}-1$

4) $\sqrt{x+1}+\dfrac{2}{\sqrt{x+1}}$

C. If $f(x) = 1 - x^2$ and $g(x) = 2x + 1$, find:

1) $f(3)$

2) $g(-2)$

3) $g(f(4))$

4) $f(g(0))$

5) $f(x+h)$

6) $f(g(x))$

7) $g(x) - f(x)$

8) $f(x)g(x)$

9) $\dfrac{g(x+h) - g(x)}{h}$

D. Using point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line…

1) with slope –2, containing the point (3, 4) _____

2) containing the points (1, -3) and (-5, 2) _____

3) with slope 0, containing the point (4, 2) _____

4) perpendicular to the line in #1, containing the point (3, 4) _____

E. Find the equation of all vertical ($x = ?$) and horizontal ($y = ?$) asymptotes, if they exist.

1) $y = \dfrac{x}{x-3}$

2) $y = \dfrac{x^3+4}{x^2-1}$

3) $y = \dfrac{2x-5}{x^2+1}$

F. For each of the following, sketch the function and then determine its domain and range.

1) $y = \sqrt{x-4}$

2) $y = 3\sin 2x$

3) $y = 9 - x^2$

4) $y = \dfrac{1}{x+1}$

G. Complete the following identities.

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

2) $2 + 2\tan^2 x =$ _____

3) $\csc^2 x - \cot^2 x =$ _____

H. Factor the following completely.

1) $2x^2 - 13x - 15$

2) $t^4 - 13t^2 + 36$

3) $x^{\frac{5}{2}} + x^{\frac{3}{2}} - 12x^{\frac{1}{2}}$

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

I. Multiply and simplify your results.

1) $\frac{2x}{3y} \bullet \frac{9y}{8x}$

2) $\frac{2u}{v} \bullet \frac{v^3}{3u}$

3) $\frac{6s^2}{5t^3} \bullet \frac{10st}{6s^3}$

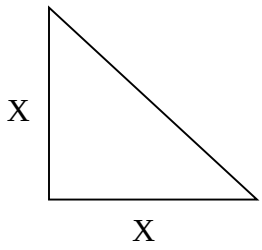
4) $\frac{x^2-4}{6} \bullet \frac{2x-4}{x+2}$

5) $\frac{3y+9}{14y} \bullet \frac{y^3}{y^2-9}$

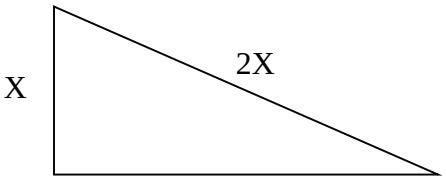
6) $\frac{t^2-25}{4s^2-9} \bullet \frac{2s+3}{5-t}$

J. Complete the missing sides and angles of the special right triangles.

1)



2)



K. Determine the exact value of each expression. Remember NO CALCULATORS!

1) $\sin 0 =$ _____

2) $\sin \frac{3\pi}{4} =$ _____

3) $\cos \pi =$ _____

4) $\cos \frac{7\pi}{6} =$ _____

5) $\tan \frac{7\pi}{4} =$ _____

6) $\tan 0 =$ _____

7) $\csc \frac{2\pi}{3} =$ _____

8) $\sec \frac{3\pi}{2} =$ _____

9) $\cot \frac{11\pi}{6} =$ _____

10) $\sin \frac{-\pi}{3} =$ _____

11) $\cos \frac{-\pi}{2} =$ _____

12) $\arcsin \frac{\sqrt{3}}{2} =$ _____

13) $\tan^{-1}(-1) =$ ____

14) $\arccos(1) =$ _____

15) $\arcsin\left(-\frac{1}{2}\right) =$ _____

L. Simplify each radical/radical expression.

1) $\sqrt{56}$

2) $\sqrt[3]{108}$

3) $\sqrt{125}+\sqrt{80}$

4) $\sqrt{\frac{64}{121}}$

5) $\left(4+\sqrt{6}\right)\left(4-\sqrt{6}\right)$

6) $\left(\sqrt{11}+2\right)^2$

M. Solve the equation for x, where x is a real number.

1) $x^2+3x-4=14$

2) $\frac{x^4-1}{x^3}=0$

3) $\left(x-5\right)^2=9$

4) $2x^2+5x=8$

5) $\frac{5}{e^{2x}+1}=1$

6) $\sqrt{x-1}-\frac{5}{\sqrt{x-1}}=0$

7) $5\ln(2x+1)-3=6$

8) $\frac{4}{x-1}-\frac{1}{6}=\frac{5}{x+3}$

Solve each equation on the interval $[0,2\pi)$.

9) $\sin x+1=0$

10) $2\cos x+\sqrt{3}=0$

11) $4\sin^2 x=1$

12) $2\sin x\cos x-\sin x=0$

Solve for z.

13) $4x + 10yz = 0$

14) $h = \sqrt[3]{\frac{2x^4}{z}}$

N. The number of elk after t years in a state park is modeled by the function $P(t) = \frac{1216}{1 + 73e^{-0.03t}}$

You may use a calculator for this problem.

1) What was the initial population?

2) When will the number of elk be 750?

3) What is the maximum number of elk possible in the park?