

Spotswood High School

Mathematics Department

To: Incoming Honors Calculus Students
From: Mrs. Mikulak - Calculus Teacher
Re: Summer Assignment

To insure a successful year in Honors Calculus in September, you are being asked to complete a summer assignment. The goal of the assignment is to provide practice of previously learned skills that will be important in Calculus. There are 45 problems based upon previously taught material that should be review in nature.

Please follow these important instructions carefully while completing this summer assignment:

1. Due Date: **The First Day of School - This assignment may be graded.**
2. Please do your best to answer each question completely.
Show all of your work neatly and clearly.
3. In the first few days of school we will refer to the Summer Assignment to review concepts that students need to know for their **first assessment**.
4. All work must be shown in the space provided. Plan ahead!
5. Use your notes from Pre-Calculus if you are having difficulty with a problem.
6. Consult the internet for help, if needed.

Graphing calculators will be used extensively throughout this course and are a tremendous aid in understanding the material. It is strongly recommended that students purchase their own Texas Instrument 83/84-Plus Graphing Calculator. Graphing calculators are available for use in the classroom, but they can not be lent to students for use outside of class.

Name: _____

1. Multiply and simplify: $(2x-3)(4x+5)(2x+3)$

2. Multiply and simplify: $(3x-2)^3$

3. Simplify: $\frac{\frac{1}{x-2} + \frac{1}{5}}{1 + \frac{5}{x-2}}$

4. Combine and simplify: $\frac{x}{x-2} - \frac{3}{x+2} + \frac{6x}{x^2-4}$

5. Write the equation in point-slope form of a line passing through the point (3, 1) and perpendicular to $2x = -2 - \frac{1}{2}y$

6. Write the equation of the line, in point-slope form and slope-intercept form, that contains the points $(-4, 6)$ and $(2, 16)$.

Point-Slope Form: _____

Slope-Intercept Form: _____

7. Simplify $\frac{18}{\sqrt{24}}$.

- 8-10. Simplify. Give the final answer with positive exponents.

8. $-3^2(xy^2)^3$

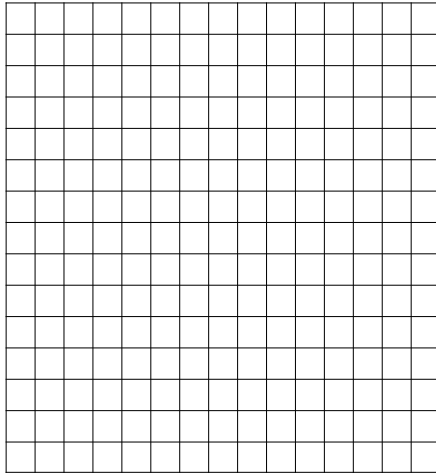
9. $\frac{-6x^{-2}y^{-6}}{18x^5y^{-8}}$

10. $\left(\frac{x^{-3}y^4}{5}\right)^{-3}$

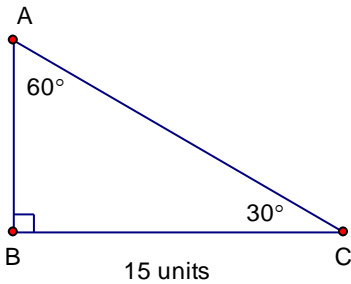
11. Sketch the graph of $f(x) = 2x^2 - 4x - 6$. Identify the vertex, axis of symmetry, and the x and y intercepts, if any.

Vertex: _____ Axis of Symmetry: _____

X-Intercepts: _____ Y-Intercept: _____



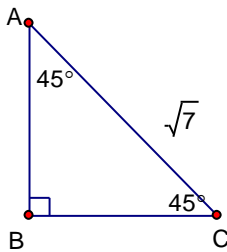
12. Find the exact value of the missing lengths of the sides of the triangle. Do Not Round Your Answers!



$\overline{AB} =$ _____

$\overline{AC} =$ _____

13. Find the exact value of the missing lengths of the sides of the triangle. Do Not Round Your Answers!



$\overline{AB} =$ _____

$\overline{BC} =$ _____

14. State the domain of the following functions in interval notation:

a. $f(x) = \sqrt{2x-3}$

b. $g(x) = \frac{x-1}{x^2-4}$

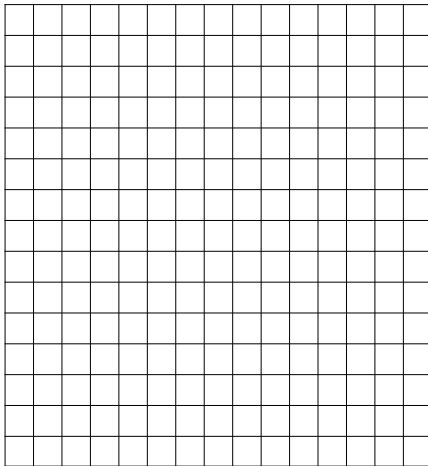
15. Graph $g(x) = (x+5)^2 - 4$. Identify the vertex, axis of symmetry, and the x and y intercepts, if any.

Vertex: _____

Axis of Symmetry: _____

X-Intercepts: _____

Y-Intercept: _____



16. Factor completely: $10x^4 - 10$

17. Factor completely: $4e^x - x^2e^x$

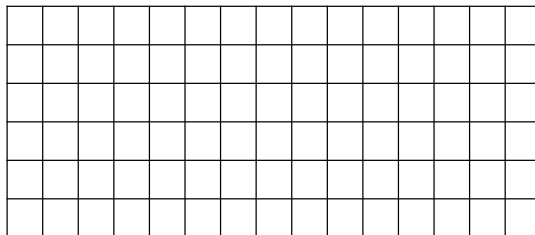
18. Give the exact value(s) of θ in the interval $0 \leq \theta < 2\pi$ that satisfy $\cos \theta = \frac{-\sqrt{3}}{2}$. Give your answer in radians.

19. Give the exact value(s) of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy $\tan \theta = 1$. Give your answer in degrees

20. Graph $y = 2\sin x$ without a calculator. State the amplitude and period of the curve.

Amplitude: _____

Period: _____



21. Given $f(x) = x^2 + 2x - 1$, find $\frac{f(x+h) - f(x)}{h}$.

22. Find all points of intersection of the graphs of $x^2 - 2x - y = 6$ and $x - y = -4$ algebraically. (Hint: Solve the system of equations) Do not use a calculator.

23. Given $f(x) = x^2 + 2x$ and $g(x) = 3x + 1$, find

a) $g(f(x))$

b) $f(g(x))$

24. Simplify $(x^2 + 3) - [3x + (8 - x^2)]$

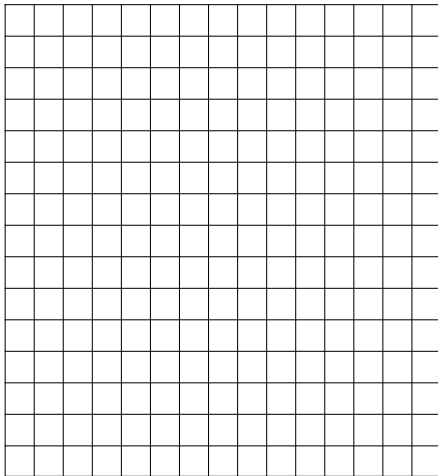
25. Divide: $\left(\frac{2}{x} - \frac{2}{x+1}\right) \div \left(\frac{4}{x^2-1}\right)$

26. Solve for x: $3e^{-0.0097x} = 36$

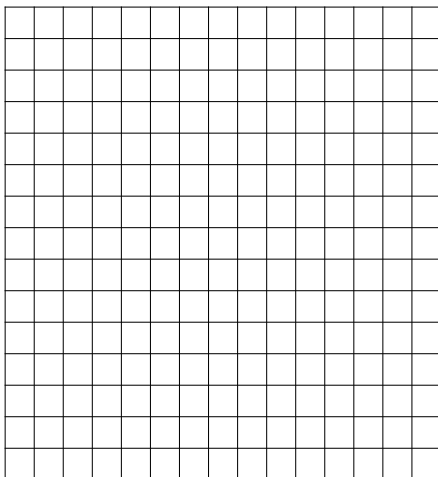
27. Write the logarithm as a single quantity: $\frac{1}{4}\log 16 + 2\log 5 - \log 7$

28. Solve for x: $3^{5x+1} = 5$.

29. Sketch the graph of the piecewise function: $f(x) = \begin{cases} \frac{1}{2}x + \frac{3}{2}, & \text{if } x < 1 \\ x^2 - 1, & \text{if } x \geq 1 \end{cases}$



30. Sketch the graph of the piecewise function: $f(x) = \begin{cases} 2x - 1, & \text{if } x \leq 2 \\ 3, & \text{if } x > 2 \end{cases}$



31. Write each radian measure as a degree measure.

a) 2π

b) $\frac{\pi}{4}$

c) $\frac{\pi}{3}$

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

32. Given $\sin \theta = \frac{7}{8}$ and $\frac{\pi}{2} \leq \theta < \pi$, find the exact value of the five other trigonometric functions without a calculator.

$$\sin \theta = \frac{7}{8}$$

$$\csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}}$$

$$\sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}}$$

$$\cot \theta = \underline{\hspace{2cm}}$$

33. Determine the quadrant in which θ lies if $\tan \theta < 0$ and $\cos \theta > 0$.

34. Find the reference angle for $\theta = \frac{7\pi}{3}$. Give the exact answer in radians and degrees.

35. Find the exact value of $\csc(225^\circ)$ without a calculator. (Show your work)

36. A television antenna sits on the roof. Two 78-foot guy wires are positioned on opposite sides of the antenna. The angle of elevation makes with the ground is 23° . How far apart are the ends of the two guy wires? Round your answer to the nearest tenth.

37. Find the exact value of the function without a calculator. $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ (Show your work)

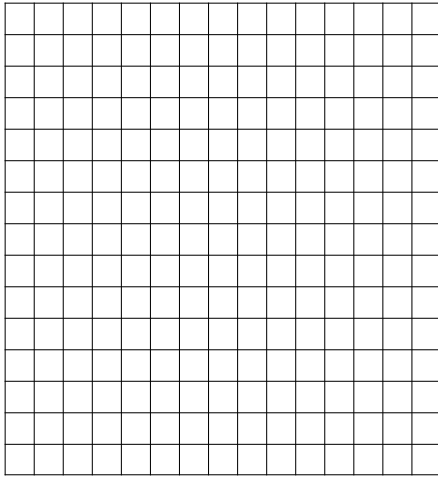
38. Find the exact value of $-4\cot\frac{\pi}{4} + \cos\frac{\pi}{3} \csc\frac{\pi}{6}$ without a calculator. Show your work!

39. Evaluate the expression $\sec\left(\tan^{-1}\left(-\frac{3}{5}\right)\right)$ without a calculator.

40. Determine whether the function $f(x) = \begin{cases} 3x & \text{if } x < 3 \\ 9 & \text{if } x = 3 \\ 12 - x & \text{if } x > 3 \end{cases}$ is continuous at $x = 3$

41. Graph the function $f(x) = \frac{3x^2}{x^2 - 4}$. Identify the vertical and horizontal asymptotes if they exist.

Horizontal asymptote: _____ Vertical Asymptote(s): _____



42. Find the equation for the transformed function when $y = \sqrt{x}$ is shifted left 2 and up 3.

43. Divide using synthetic division: $\frac{x^7 + x^5 - 10x^3 + 12}{x + 2}$

44. Divide using long division: $\frac{10x^3 - 26x^2 + 17x - 13}{5x - 3}$

45. Solve for x: $\frac{x}{x-1} = \frac{2x+10}{x+11}$