Calculus with Applications Summer Review Packet

This packet is a review of the material you should know as you ***enter*** Calculus with Applications.
This will not be due on any specific date. However, the material covered on this review
will most likely show up on a Chapter 1 assessment.

1. Simplify. Show work that leads to your answer.

   a) $\frac{x-4}{x^2-3x-4}$ b. $\frac{x^3-8}{x-2}$ c. $\frac{5-x}{x^2-25}$

2. Trigonometric Pythagorean Identities:

   a) ____________________ c) ____________________

   b) ____________________

3. Simplify each expression. Write answers with positive exponents, where applicable:

   a) $\frac{1}{x+h} - \frac{1}{x}$ b) $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$ c) $\frac{12x^{-3}y^2}{18xy^{-1}}$ d) $\left(5a^{\frac{2}{3}}\right)\left(4a^{\frac{3}{2}}\right)$

   e) $\left(4a^{\frac{5}{3}}\right)^{\frac{3}{2}}$ f) $\log\frac{1}{100}$ g) $\ln e^7$ h) $27^{\frac{2}{3}}$

   i) $\log_{\frac{1}{2}} 8$ j) $\ln 1$

4. Solve for **z**: $4x + 10yz - 3 = 5w + 6xz$

5. Given: $f(x) = \{(3,5), (2,4), (1,7)\}$ $g(x) = \sqrt{x} - 3$ $h(x) = x^2 + 5$ find (simplified):

   a) $h(g(x))$ b) $g(h(-2))$ c) $f^{-1}(x)$

   d) to find $g^{-1}(x)$, you ____________________________. Fill in the blank, then find $g^{-1}(x)$

6. Expand and simplify:

$$\sum_{n=2}^{5}(3n-6)$$

7. Write an equation for the lines described below. Use the point-slope form: $y - y_1 = m(x - x_1)$
   Show all work.
   a) With slope -2, containing the point (3, 4)
   b) Containing the points (1, -3) and (-5, 2)
   c) With slope 0, containing the point (4, 2)
   d) Parallel to $2x - 3y = 7$ and passes through (5, 1)
   e) Perpendicular to the line in problem 7a, containing the point (3, 4)

8. Without a calculator, determine the exact value of each expression:

a) $\sin\frac{\pi}{2}$ b) $\sin\frac{3\pi}{4}$ c) $\cos\pi$ d) $\cos\frac{7\pi}{6}$

e) $\cos\frac{\pi}{3}$ f) $\tan\frac{7\pi}{4}$ g) $\tan\frac{2\pi}{3}$ h) $\tan\frac{\pi}{2}$

i) $\csc\frac{\pi}{3}$ j) $\sec\frac{5\pi}{6}$ k) $\cot\frac{2\pi}{3}$ l) $\sec\frac{3\pi}{2}$

9. For each function: Make a neat graph. This means labeling your axes with scale, showing at least 3 points. Name the Doman and Range. For the problems with asymptotes, name and graph those asymptotes.

a) $y = \sin x$ e) $y = \ln x$ i) $y = \sqrt[3]{x}$

b) $y = x^3 - 2x^2 - 3x$ f) $y = e^x$ j) $y = |x + 3| - 2$

c) $y = x^2 - 6x + 1$ g) $y = \frac{1}{x}$ k) $y = \sqrt{x - 4}$

d) $y = \frac{x+4}{x-1}$ h) $y = \frac{x^2-4}{x+2}$ l) $y = \sqrt{x^2 + 4}$

10. Make a neat sketch of the following piecewise function:

$$f(x) = \begin{cases} x^2, & if\ x < 0 \\ x + 2, & if\ 0 \le x < 3 \\ 4, & if\ x \ge 3 \end{cases}$$

11. Solve for x, where x is a real number. Show the work which leads to your solution:

a) $2x^2 + 5x = 3$ d) $\log x + \log(x - 3) = 1$ g) $12x^2 = 3x$

b) $(x - 5)^2 = 9$ e) $|x - 3| < 7$ h) $27^{2x} = 9^{x-3}$

c) $(x + 3)(x - 3) > 0$ f) $\ln x = 2t - 3$ i) $x^2 - 2x - 15 \le 0$

12. Determine all points of intersection:

a) Parabola $y = x^2 + 3x - 4$ and the line $y = 5x + 11$

b) The functions $y = \cos x$ and $y = \sin x$, in the first quadrant

13. Simplify the following complex fractions:

a) $\dfrac{\frac{x}{2}-5}{6+\frac{3}{x}}$ c) $\dfrac{\frac{1}{x}-\frac{x}{x^{-1}+1}}{\frac{3}{x}}$

b) $\dfrac{\frac{1}{2x^2-2}}{\frac{2}{x+1}+\frac{x}{x^2-2x-3}}$ d) $\dfrac{\frac{3}{2x^2+6x+18}-\frac{x}{x^3-27}}{\frac{5x}{3x-9}-\frac{3}{x-3}}$