Math 172 Prerequisite Worksheet

Due: Friday, August 31, 2018

Show work and justify answers. Little or no work may receive little or no credit.
You are encouraged to get help from your instructor or the MLC if needed.

ALGEBRA

1. (2 pts) Solve for $x$: \[x^2 - 7x + 14 = 2\]
   \[
   x^2 - 7x + 12 = 0
   \]
   \[
   (x-4)(x-3) = 0
   \]
   \[
   x = 4, x = 3
   \]

2. (2 pts) Solve for $x$: \[\frac{9}{x-1} + 1 = x\]
   \[
   \frac{9}{x-1} = x - 1
   \]
   \[
   9 = (x-1)^2
   \]
   \[
   \pm 3 = x - 1
   \]
   \[
   x = 4, x = -2
   \]

TRIG - Review sections 1.4 and 1.5 in your textbook to answer questions 3-5.

3. (6 pts) Sketch a graph for each. Clearly label the scale on the axes and provide appropriate features.
   
   (a) $y = \sin x$
   
   (b) $y = 2\cos x$
   
   (c) $y = \arctan x$

4. (5 pts) Evaluate exactly - no calculators.
   
   (a) $\sin \left(\frac{\pi}{3}\right)$
   
   (b) $\sin \left(\frac{4\pi}{3}\right)$
   
   (c) $\cos \left(\frac{5\pi}{3}\right)$
   
   (d) $\tan \left(\frac{\pi}{4}\right)$
   
   (e) $\arctan \left(\sqrt{3}\right)$

5. (4 pts) Use an appropriate triangle to simplify the expression so that no trigonometric functions remain.
   
   \[
   \sin \left(\arctan \frac{x}{\sqrt{x^2 + 1}}\right)
   \]
   
   (the angle $\theta$ whose tangent is $x$)

   \[
   \sin \theta = \frac{x}{\sqrt{x^2 + 1}}
   \]

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6. (6 pts) Differentiate.

   (a) $f(x) = x^{7/4} \sec x$
   
   \[
   f'(x) = \frac{7}{4} x^{3/4} \sec x \tan x + x^{7/4} \sec x
   \]

   (b) $g(t) = \sqrt{t} + \tan t$
   
   \[
   g'(t) = \frac{1}{2} (t + \tan t)^{-1/2} (1 + \sec^2 t)
   \]
   
   \[
   = \frac{1 + \sec^2 t}{2 \sqrt{t + \tan t}}
   \]
7. (12 pts) Evaluate. Appropriate notation is required. Show all work.

(a) \[ \lim_{x \to 3} \frac{x^3 - 9x}{x - 3} = \lim_{x \to 3} \frac{x(x^2 - 9)}{x - 3} = \lim_{x \to 3} \frac{x(x+3)(x-3)}{x - 3} = \lim_{x \to 3} x(x+3) = 18 \]

(b) \[ \lim_{x \to \infty} \frac{\ln(e^{2x} + 1)}{4x} = \lim_{x \to \infty} \frac{\frac{1}{e^{2x} + 1} \cdot 2e^{2x}}{4} = \lim_{x \to \infty} \frac{2e^{2x}}{4(e^{2x} + 1)} = \frac{2}{4} \cdot \frac{1}{2} \]

Form: Use L'Hopital's Rule

(c) \[ \int \frac{x - 1}{x} \, dx = \int \frac{x}{x} \, dx - \int \frac{1}{x} \, dx = \int 1 \, dx - \int \frac{1}{x} \, dx = x - \ln |x| + C \]

(d) \[ \int_{\pi/4}^{\pi/3} \sin(2x) \, dx = \frac{1}{2} \int_{\pi/2}^{2\pi/3} \sin u \, du = \frac{1}{2} \left[ -\cos u \right]_{\pi/2}^{2\pi/3} = \frac{1}{2} \left( -\cos \frac{2\pi}{3} + \cos \frac{\pi}{2} \right) = \frac{1}{4} \]

8. (2 pts) Consider the function \( y = \sqrt{1-x^2} \)

(a) Sketch a graph of the function.

(b) Evaluate \( \int_{-1}^{1} \sqrt{1-x^2} \, dx \) as an area.

This is the top half of a circle of radius 1
Therefore, \( A = \frac{\pi}{2} \)

9. (3 pts) Answer the following questions using the M172 main course webpage:

(a) What are the dates of the three common hour exams? \( 9/19, 10/16, 11/14 \)

(b) What is the date AND time of the final exam? \( 12/12, 10 \text{ am} \)

(c) Can you use a calculator (or other electronic device) during a M172 exam? \( \text{Nope} \)