Math 1113 C3 Precalculus Instructor: Dr. Predrag Punoševac

Final Exam

Student Name:_____
Student ID#:_____

Each problem is worth 10 points. Give a complete solution to receive the full credit!

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1. Verify trigonometric identity
$$\sin\theta = \frac{2\tan\frac{\theta}{2}}{1+\tan^2\frac{\theta}{2}}.$$

2. Solve trigonometric inequality $|\sin(t)| > \frac{1}{2}$.

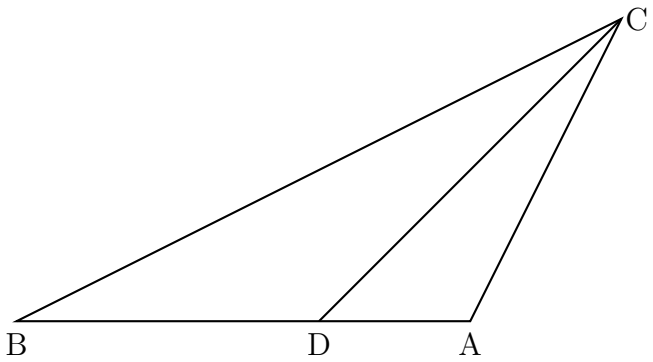
3. Rewrite the expression $\sin(\tan^{-1}(2x) - \sin^{-1}(2x))$ as an algebraic expression in x.

4. Solve the trigonometric equation $5\tan^3(x) - 5\tan^2(x) - \tan(x) + 1 = 0$ over the field of real numbers.

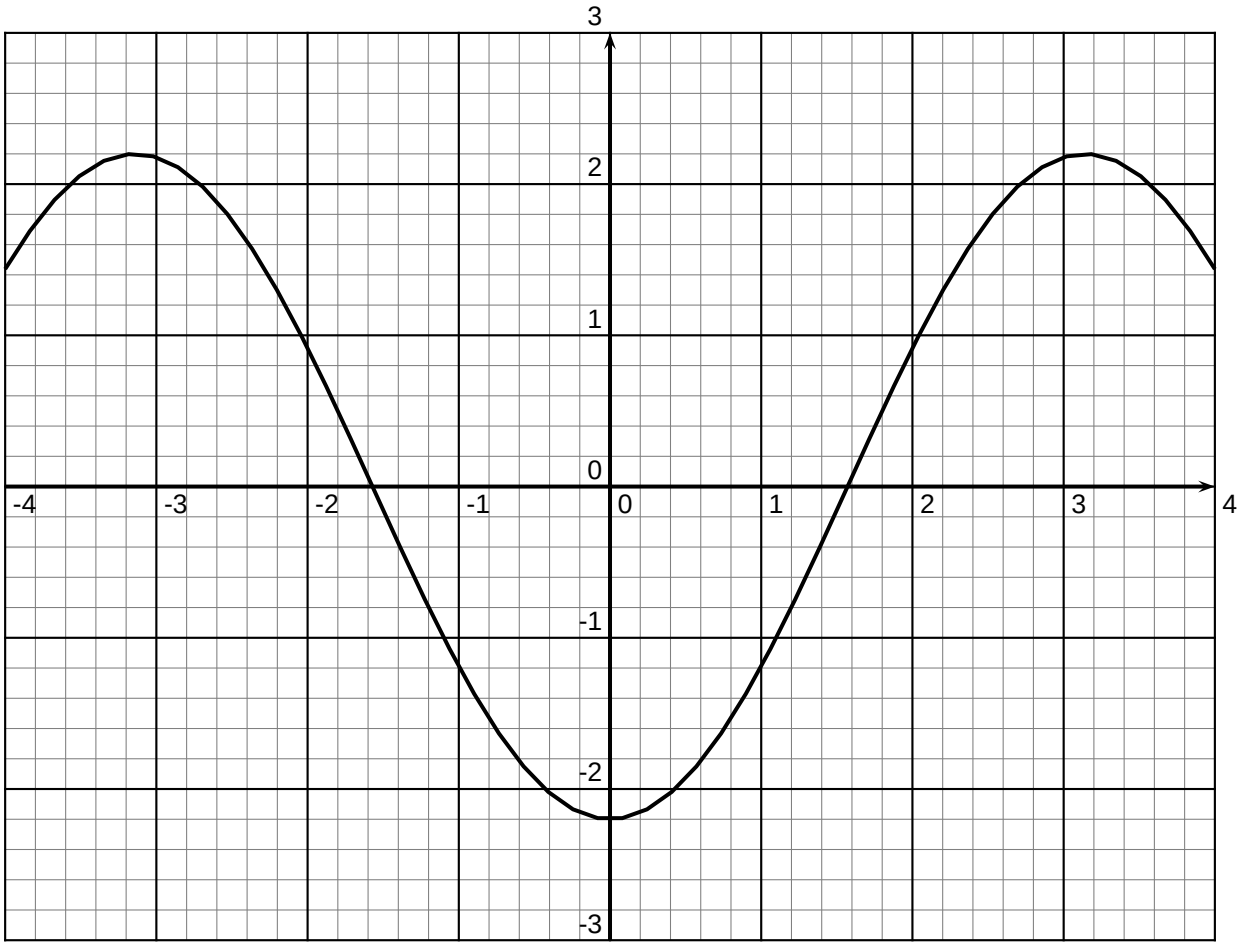
5. Solve logarithm equation $\log(x - 10) - \log(3 - x) = 1$ over the field of real numbers.

6. Which of the following logarithms are defined?
   (a) $\log_{0.1}(\log 0.001)$
   (b) $\log_1 3^{-2012}$
   (c) $\log_3(\sin 1)$
   (d) $\log_{10^{-2012}} \pi$
   (e) $\log_8\left(\cos \frac{\pi}{2}\right)$

7. For the triangles shown, find the area of the triangle $\triangle CAD$. Assume $BD = CD = 19$, $\angle CBD = 30°$, and $\angle DCA = 20°$.



8. The graph of a sine curve is given below.



(a) Determine the amplitude of the curve.

(b) Determine the period of the curve.

(c) Determine the phase shift of the curve.

(d) Determine the function in the form $f(x) = a\sin(k(x-b))$.

9. Show that the function
$$y = \tan(x + \frac{\pi}{2}).$$
is "1-1" on the interval $(0, \pi)$ therefore invertible on its image. Sketch the graph of its inverse function.

10. Find the parameter of the shaded region in the figure where $\alpha = \frac{\pi}{4}$ and b=11.