

For full credit show all of your work (legibly!), unless otherwise specified. Answers should be simplified down to arithmetic expressions whenever possible — only *unsimplifiable* trigonometric and exponential functions may be left unevaluated.

1. **(10 points)** Answer the following questions about trigonometry.

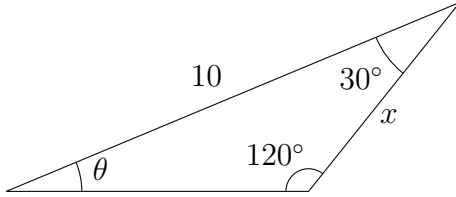
(a) **(3 points)** Find the terminal point associated with  $t = \frac{-9\pi}{2}$ .

(b) **(4 points)** Identify the period, amplitude, and vertical shift of the periodic function  $g(x) = 7 \sin(5x) - 2$ .

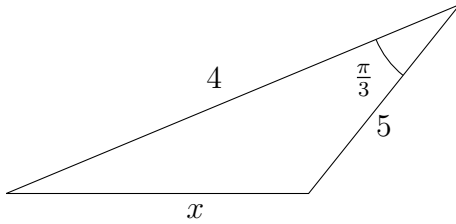
(c) **(3 points)** Evaluate  $\cot \frac{5\pi}{6}$ .

2. (10 points) Calculate the labeled quantities in the triangles (not drawn to scale) below.

(a) (5 points) Determine  $x$  and  $\theta$ :



(b) (5 points) Determine  $x$ :



3. (12 points) Answer the following questions about trigonometric equations.

(a) (4 points) Find *all* solutions to the equation  $6 \sin(2x) = -3\sqrt{3}$ .

(b) (4 points) Find *any one* solution to the equation  $4 \sec(3x) - 2 = 6$ .

(c) (4 points) Verify the trigonometric identity  $\frac{1-\sin x}{1+\sin x} = (\sec x - \tan x)^2$ .

4. **(10 points)** Answer the following questions about evaluating trigonometric expressions.

(a) **(2 points)** Evaluate  $\arctan(-1)$ .

(b) **(4 points)** Evaluate  $\csc(\arctan(\frac{3}{4}))$ .

(c) **(2 points)** Evaluate  $\arcsin \frac{1}{2}$ .

(d) **(3 points)** Evaluate the expression  $\cos(55^\circ) \cos(10^\circ) + \sin(55^\circ) \sin(10^\circ)$ .

5. (10 points) The following ten graphs are of the following functions:

$$A(x) = \cot\left(\frac{x}{2}\right)$$

$$B(x) = 1 + \sec x$$

$$C(x) = \sin 3x$$

$$D(x) = 3 \sin x$$

$$E(x) = \sin \frac{x}{3}$$

$$F(x) = \frac{1}{x-1} + \frac{1}{x+1}$$

$$G(x) = 2^x$$

$$H(x) = \left(\frac{3}{4}\right)^x$$

$$I(x) = \log_{1/2} x$$

$$J(x) = x(x+1)(x-1)(x+2)(x-2)$$

Label each picture with the letter of the appropriate function.

