Unit Assessment 5 A

Each question (unless otherwise mentioned in the question) is 10 points. Total possible points = 100.
You need 50 points to get to 100%
You will use the following guidelines to answer the questions
pick 1 question from #1, 2
pick 1 question from #4, 5, 6
pick 1 question from #7, 8
You have to do #3, #9 and #10.

Unit 1 – 3

1. Given $f(x) = \dfrac{x-1}{x^2-3x}$, $g(x) = x+2$,

     (a) Find $f \circ g(x)$

     (b) if $h(x) = f \circ g(x)$, what is the implied domain for h(x)?

     (c) Graph $h(x)$, identify possible asymptotes, x-intercepts, and y-intercepts.

     (d) Solve $f \circ g(x) = 1$

2. Solve $\begin{cases} \log_4 \sqrt[4]{2x-y} + \log_4 \sqrt[3]{x-2y} = \dfrac{5}{24} \\ \log_4 \sqrt[3]{(2x-y)^2} + 2\log_4(x-2y) = 0 \end{cases}$

Unit 4-5

3. Given $\sin x = -\dfrac{5}{13}, \pi < x < \dfrac{3\pi}{2}$, $\tan y = -\dfrac{12}{5}, \dfrac{3\pi}{2} < y < 2\pi$ and $\begin{cases} k\sin(x-y) - m\cos(x-y) = 1 \\ k\sin(x+y) + m\cos(x+y) = \dfrac{1}{169} \end{cases}$

     (a) Find m and k.

     (b) Find $\sec\left(\dfrac{y}{2}\right)$

     (c) Find $\sqrt{m^2+k^2}\,\tan(x-y)$

4. Evaluate $\tan\left(\arctan\dfrac{4}{5} + \arccos\left(-\dfrac{1}{2}\right)\right)$

5. Rewrite the following trigonometric expression to algebraic expression. All angles in the following expressions are in the first quadrant.

$$\cos\left(\arctan x - \arctan\dfrac{1}{x}\right)$$

6. Verify trigonometric identity: $\qquad\qquad \sin(x+y)\sin(x-y) = \sin^2 x - \sin^2 y$

7. Solve the trigonometric equation: $\qquad$ $-2\tan^3 x = \tan x$

8. Given $x \in [0, 2\pi)$, solve the trigonometric equations: $\qquad$ $\cos\left(\dfrac{x}{2}\right) = \cos x + 1$
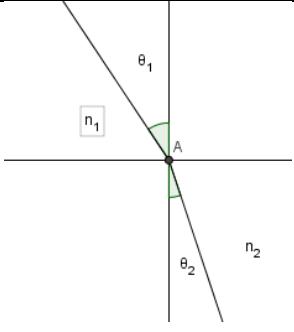
9. (Angles of depression)

A tourist standing on the top of a light house saw ship A on the sea with angle of depression of $10°$ and ship B with angle of depression of $7°$. On a plaque in the light house it read that it was 200 feet tall.
(a) How far apart were these two ships? (round your answer to the whole feet)
(b) If at time of the sighting of the ships, A and B were starting to move towards the shore, and A was moving at speed of 15 ft/sec, what should be the speed of B so that two ships can arrive at the shore at the same time? (round your answer to the whole ft/sec)

10. (Snell's Law)

	Snell's law of refraction says that the angle of incident θ_1 and the angle of refraction θ_2 has the following relationship $n_1 \sin\theta_1 = n_2 \sin\theta_2$ where n are the refractive index of the medium where the light travel. in vacuum (air) n = 1 in water, n = 1.3

A person 5 feet 10 inches tall standing in a river with water reached his waist (about 3 feet deep) saw a trout appeared to be 5 feet away on the riverbed from where he stood. Assume his eye line is 2 inches below when measured from the top of his head. Use the Snell's law to estimate actually how far away was the trout from where he stood? (Assume further that the fish was on the floor of the river. Round your answers to the tenth inch)