Name: _____
Student ID: _____

Test 3

This test is graded out of 48 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1.

a. *(4 marks)* Draw the two "special triangle" which help identify the special angles. Label the angles of the triangles and the lengths of the sides.

b. *(4 marks)* Find the exact value of $\csc 675^\circ$

c. *(4 marks)* Find the exact value of $\sin \frac{7\pi}{6}$

Question 2.

a. *(2 marks)* What angle θ ($0° \leq \theta < 360°$) is co-terminal to $3070°$.

b. *(2 marks)* Consider an angle θ in standard position. Then find the quadrant that its terminal edge lies in, if $\sec\theta < 0$ and $\cot\theta < 0$.

c. *(4 marks)* Find the values of the other trigonometric functions, if $\sin\theta = \frac{-1}{2}$ and $\tan\theta < 0$.

Question 3.

a. *(4 marks)* Sketch the graph of $f(x) = \left(\frac{1}{2}\right)^x + 1$.

b. *(4 marks)* Sketch the graph of $g(x) = \log_2(x+1)$

c. *(2 bonus marks)* State the domain and range of $f(x)$ and $g(x)$.

d. *(1 bonus mark)* Is $f(x)$ injective, justify.

Question 4.

a. *(4 marks)* Solve the right triangle ABC ($C = 90°$) given: $b = 10$, $B = 27°$.

b. *(4 marks)* Solve for θ, giving the exact solution, $0° \leq \theta < 360°$

$$\sqrt{3}\csc\theta + 2 = 0$$

Question 5. Solve for x.

a. *(4 marks)*

$$3^{x-1} = 2^{3-2x}$$

b. *(4 marks)*

$$\log_2(x-3) + \log_2(x+3) = 4$$

Question 6. *(4 marks)* A tree casts a 25m long shadow when the angle of elevation of the sun is 31°. How tall is the tree?

Bonus. *(3 marks)* Solve the triangle ABC where $A = 35^\circ$, $a = 70$, $c = 100$. *Do not assume that an angle of the triangle is* 90°.