DEPARTMENT OF MATHEMATICS & STATISTICS
MATH 0863 - Precalculus

FINAL EXAMINATION   **DECEMBER 2009**

TIME: 3 HOURS

MARKS

Place all solutions on these sheets
NO CALCULATORS ALLOWED

This is the quadratic formula as seen in class : $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1. Solve the following equations:

[4]   (a) $3(x - 2) = 2(x + 5) + 4$

[4]   (b) $2x^2 + 18x + 20 = -20$

[4]   (c) $\dfrac{18}{x} = x - 3$

[3]   (d) $\log_3(x - 4) + \log_3(x + 4) = 2$

[3]   (e) $(8)^{2x+1} = 16$

[3] (f) $e^{x+2} = 8$

[2] 2. (a) Find an equation for the line passing through $(4, -5)$ and which is perpendicular to $2x - y = 3$.

[2] (b) Sketch the graph of: (label intercepts) $3x + y = 7$.

3. Evaluate giving exact answers:

[2] (a) $\dfrac{1}{(2)^{-1}} + 2(4)^2 =$

[2] (b) $8^{\frac{2}{3}} =$

[2] (c) $\log_3 81 =$

[2] (d) $\log(2) + \log(5) =$

[2] (e) $\sin \dfrac{2\pi}{3} =$

[2]   (f) $\tan(-150°) =$

[2]   (g) $480° = $ _____radians

[2]   (h) $\dfrac{3\pi}{2}$ radians $=$ _____degrees

4. For the function $f(x) = x^2 - 4x - 12$ determine:

[3]   (a) the vertex

[2]   (b) the domain and range of $f(x)$

[3]   (c) the x and y intercepts

[4]   (d) graph the function

[2]   (e) solutions of $x^2 - 4x - 12 < 0$ (find the interval where $f(x) < 0$)

5. Sketch the following functions clearly labelling all important features

[5]   (a) $y = \dfrac{(x-1)}{(x+2)}$

[5]   (b) $y = (x-3)^2(x+1)(x^2-5x+4)$

[2]   6. (a) Sketch the following function clearly labelling all important features:
        $y = 2\sin x + 1$

[1]   (b) If $0 < x < 2\pi$, for what values of x is $f(x)$ increasing?

7. An archer standing on the roof of a building shot an arrow into the air. If the height (h) of the arrow in meters above the ground after (t) seconds can be described by the equation: $h = -5t^2 + 20t + 25$, find

[2] (a) the height from which the arrow was shot

[2] (b) the time the arrow reaches its maximal height.

[2] (c) the maximal height reached by the arrow.

[2] (d) the time it took the arrow to reach the ground.

[2] (e) Sketch a graph to represent the arrow.

8. (a) If $\sin \alpha = \frac{3}{5}$, find

[1]   (i) how many different possible values can $\cos \alpha$ take? _____

[2]   (ii) possible $\cos \alpha$ values are:_____

[1]   (iii)if α is in the second quadrant (QII), then $\cos \alpha =$_____

(b) Solve the following: $(0 \le \theta \le 360°)$

[2]   (i) $2 \sin \theta = 1$

[2]   (ii) $\cos^2 \theta - 1 = 0$