//AUTHOR: DAN CRISP

//SymbolicToolboxAssignment

**#Q1**

>> Syms x; f = (x^2 - 4\*x)\*(x^2 - 4\*x + 1) – 20;

>> a = expand(f)

x^4 - 8\*x^3 + 17\*x^2 - 4\*x - 20

>> b = simplify(f/(x^2 – 4\*x – 4))

x^2 - 4\*x + 5

>> c = factor(f)

[ x^2 - 4\*x + 5, x^2 - 4\*x - 4]

>> d = roots(sym2poly(f))

4.8284 + 0.0000i

2.0000 + 1.0000i

2.0000 - 1.0000i

-0.8284 + 0.0000i

>> e = subs(f,x,d(2))

0

>> F = limit(f,x,-1)

10

**#Q2**

Determine the polynomial that has the following roots: 4, -2, 1, 0

>> syms x; theRoots=[4, -2, 1, 0]; theEquation = poly2sym(poly(theRoots))

x^4 - 3\*x^3 - 6\*x^2 + 8\*x

#Q3

Solve the following system.

>> syms x y z; one = sym('x+3\*y-z=2'); two = sym('x-y+z=3'); three = xym('3\*x-5\*y=4');

>> [x,y,z] = solve(symVector)

x = 33/16

y = 7/16

z = 11/8

**#Q4**

Find the values of x where the graph of y = 3^x - 3x has a horizontal tangent line. For each point found, determine whether the function has a max, min or neither there. Give decimal answers.

>> syms x; y = 3^x - 3\*x; ydiffx = diff(y,x); critpt = solve(ydiffx)

critpt = (log(3) - log(log(3)))/log(3)

>> subs\_check = subs(ydiffx,x,critpts)

subs\_check = 3^((log(3) - log(log(3)))/log(3))\*log(3) - 3

>> simplify(subs\_check)

subs\_check = 0

**#Q5**

Ship A is traveling north at 6 mph and ship B is traveling west at 12 mph. When ship A was dead ahead of ship B, it was 6 miles away. Determine the minimum distance between the ships.

>> syms t; Avy = 6\*t; Bvx = -12\*t+6; dist = sqrt(Avy^2 + Bvx^2)

6\*((12\*t - 6)^2/36 + t^2)^(1/2)

>> difft = diff(dist,t)

difft = (3\*(10\*t - 4))/((12\*t - 6)^2/36 + t^2)^(1/2)

>> tmin = solve(difft)

tmin = 2/5

>> distMin = subs(dist,t,tmin)

distMin = (6\*5^(1/2))/5

At 0.4 hours, the two ships were 2.6833 miles apart.

**#Q6**

A ceramic tile has the design show in the figure. The border between the red and white areas has the equation y = A sin(pi\*x/15). Determine the value of A (find the exact and decimal approximation) such that the white area equals the red area.

>> syms A x; Area = 15\*5; y = A\*sin(pi\*x/15); red = int(y,x,0,15)

red = (30\*A)/pi

>> white = Area - red; Answer-A = solve(sym(white==red))

Answer = (5\*pi)/4

CHECK:

>> subs(white,A,Answer) = 75/2

>> subs(red,A,Answer) = 75/2