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Homework 11

ENGR 133-003 Created by Sean DeBarr 4/12/2019

```
clear
close all
clc
```

Problem T11.1-1

```
clear

disp("**********************" + newline + "Problem T11.1-1" + newline);

% declare expressions
syms x;
E1 = x^3 - 15*x^2 + 75*x - 125;
E2 = (x+5)^2 - 20*x;

%
 ********************************************************************************
% Part a
disp("Part a" + newline);

% display product
disp(simplify(E1 * E2));

%
 ********************************************************************************
% Part b
disp("Part b" + newline);

% display quotient
disp(simplify(E1 / E2));

%
 ********************************************************************************
% Part c
disp("Part c" + newline);
clear

% define x
x = sym(7.1);
```

```
% redeclare expressions
E1 = x^3 - 15*x^2 + 75*x - 125;
E2 = (x+5)^2 - 20*x;

% display symbolic form
fprintf("Sum in symbolic form: %s\n", (E1 + E2));

% display numeric form
fprintf("Sum in numeric form: %.4f\n\n", double(E1 + E2));
```

```
**********
Problem T11.1-1

Part a

(x - 5)^5

Part b

x - 5

Part c

Sum in symbolic form: 13671/1000
Sum in numeric form: 13.6710
```

Problem 11.1

```
clear

disp("**********" + newline + "Problem 11.1" + newline);

%
 ************************************************************************
% Part a
disp("Part a" + newline);

% declare expression
syms x;
A = (sin(x)^2 + cos(x)^2);

% simplify and display result
disp(simplify(A));

%
 ************************************************************************
% Part b
disp("Part b" + newline);
clear

% declare expression
```

```
syms x y;
B = sin(x + y);

% expand and display result
disp(expand(B));

%
 ************************************************************************
% Part c
disp("Part c" + newline);
clear

% declare expression
syms x;
C = sin(2*x);

% expand and display result
disp(expand(C));

%
 ************************************************************************
% Part d
disp("Part d" + newline);
clear

% declare expression
syms x;
D = (cosh(x)^2 - sinh(x)^2);

% simplify and display result
disp(simplify(D));

**********
Problem 11.1

Part a

1

Part b

cos(x)*sin(y) + cos(y)*sin(x)

Part c

2*cos(x)*sin(x)

Part d

1
```

Problem 11.2

```
clear

disp("**********************" + newline + "Problem 11.2" + newline);

% declare expression
% let t = theta
syms y t x;
y = cos(5 * t);

% expand the expression and substitute cos(theta) for x
y = expand(y);
y = subs(y, cos(t), x);

% display expression
fprintf("The expression is: %s\n\n", y);
```

```
**********************
Problem 11.2

The expression is: 5*x - 20*x^3 + 16*x^5
```

Problem 11.4

```
clear

disp("**********************" + newline + "Problem 11.4" + newline);

% declare expression
syms x y r;
C = x^2 + y^2 - r^2;

% substitute in the offset coordinates
syms a b;
C = subs(C, [x, y], [x - a, y - b]);

% expand and display the expression
fprintf("The expanded expression is: ");
disp(expand(C));

% display manually determained values of the coefficients
fprintf("The coefficients are:\n");
fprintf("A = 1\nB = -2a\nC = 0\nD = -2b\nE = 1\nF = r^2 - a^2 -
 b^2\n");
```

```
**********************
Problem 11.4

The expanded expression is: a^2 - 2*a*x + b^2 - 2*b*y - r^2 + x^2 +
 y^2
```

```
The coefficients are:
A = 1
B = -2a
C = 0
D = -2b
E = 1
F = r^2 - a^2 - b^2
```

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