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% The proctile problem with zero air resistance
% in a gravitational field with constant g.
% Written by Daniel T. Valentine .. September 2006
% Revised by D. T. Valentine ........... 2012/2016
% An eight-step structure plan applied in MATLAB:
%
% 1. Define the input variables.
%
g = 9.81; % Gravity in m/s/s.
vo = input('What is the launch speed in m/s?');
tho = input('What is the launch angle in degrees?');
tho = pi*tho/180; % Conversion of degrees to radians.
%
% 2. Calculate the range and duration of the flight.
%
txmax = (2*vo/g) * sin(tho);
xmax = txmax * vo * cos(tho);
%
% 3. Calculate the sequence of time steps to compute
% trajectory.
%
dt = txmax/100;
t = 0:dt:txmax;
%
% 4. Compute the trajectory.
%
x = (vo * cos(tho)) .* t;
y = (vo * sin(tho)) .* t - (g/2) .* t.^2;
%
% 5. Compute the speed and angular direction of the
% projectile. Note that vx = dx/dt, vy = dy/dt.
%
vx = vo * cos(tho);
vy = vo * sin(tho) - g .* t;
v = sqrt(vx.*vx + vy.*vy); % Speed
th = (180/pi) .* atan2(vy,vx); % Angular direction
%
% 6. Compute the time and horizontal distance at the
% maximum altitude.
%
tymax = (vo/g) * sin(tho);
xymax = xmax/2;
ymax = (vo/2) * tymax * sin(tho);
%
% 7. Display in the Command Window and on figures the ouput.
%
disp(['Range in meters =',num2str(xmax),',' ...
' Duration in seconds =', num2str(txmax)]);
disp(' ')
disp(['Maximum altitude in meters = ',num2str(ymax), ...
', Arrival at this altitude in seconds = ', num2str(tymax)])
plot(x,y,'k',xmax,y(size(t)),'o',xmax/2,ymax,'o')
title(['Projectile flight path: v_o = ', num2str(vo),' m/s' ...
', \theta_o = ', num2str(180*tho/pi),' degrees'])
xlabel('x'), ylabel('y') % Plot of Figure 3.4.
figure % Creates a new figure.
plot(v,th,'r')
title('Projectile speed vs. angle')
xlabel('V'), ylabel('\theta') % Plot of Figure 3.5.
%
% 8. Stop.
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%%=========================================================================
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t = 0:.1:2*pi;
subplot(2,2,1)
plot(t,sin(t))
subplot(2,2,2)
plot(t,cos(t))
subplot(2,2,3)
plot(t,exp(t))
subplot(2,2,4)
plot(t,1./(1+t.^2))


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h = inline( 'cos(8*t) + cos(9*t)');
x = 0 : 20/300 : 20;
plot(x, h(x)), grid

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function x = quadratic(a,b,c)
% Equation:
% a*x^2 + b*x + c = 0
% Input: a,b,c
% Output: x = [x1 x2], the two solutions of
% this eequation.
if a==0 & b==0 & c==0
disp(' ')
disp('Solution indeterminate')
elseif a==0 & b==0
disp(' ')
disp('There is no solution')
elseif a==0
disp(' ')
disp('Only one root: equation is linear')
disp(' x ')
x1 = -c/b;
x2 = NaN;
elseif b^2 < 4*a*c
disp(' ')
disp(' x1, x2 are complex roots ')
disp(' x1 x2')
x1 = (-b + sqrt(b^2 - 4*a*c))/(2*a);
x2 = (-b - sqrt(b^2 - 4*a*c))/(2*a);
elseif b^2 == 4*a*c
x1 = -b/(2*a);
x2 = x1;
disp('equal roots')
disp(' x1 x2')
else
x1 = (-b + sqrt(b^2 - 4*a*c))/(2*a);
x2 = (-b - sqrt(b^2 - 4*a*c))/(2*a);
disp(' x1 x2')
end
if a==0 & b==0 & c==0
elseif a==0 & b==0
else
```

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disp([x1 x2]);
end
end
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Error: File: C:\Documents and Settings\Administrator\##\2017 class\matlab class\in
Function definitions are not permitted at the prompt or in scripts.
```

Exercise 3.2

```
m=44; n=28;
while m~=n
    if m > n
        m = m-n;
    else
        n = n-m;
    end
end
display(m)
```

Published with MATLAB® 7.9