**27.27 (a)** The exact solution is

$$y = Ae^{5t} + t^2 + 0.4t + 0.08$$

If the initial condition at $t = 0$ is 0.8, $A = 0$,

$$y = t^2 + 0.4t + 0.08$$

Note that even though the choice of the initial condition removes the positive exponential terms, it still lurks in the background. Very tiny round off errors in the numerical solutions bring it to the fore. Hence all of the following solutions eventually diverge from the analytical solution.

(b) 4th order RK. The plot shows the numerical solution (bold line) along with the exact solution (fine line).
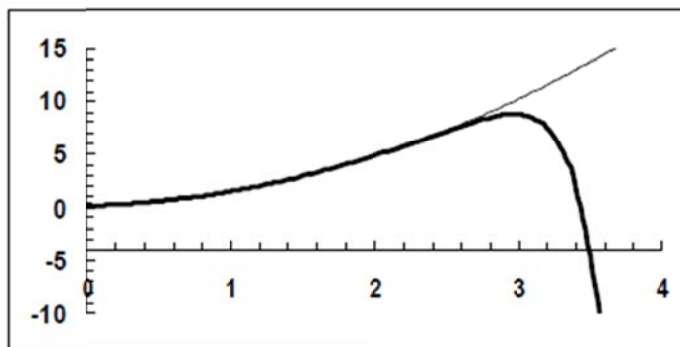
(c)
```
function yp=dy(t,y)
yp=5*(y-t^2);
>> tspan=[0,5];
>> y0=0.08;
>> [t,y]=ode45('dy1',tspan,y0);
```

(d)
```
>> [t,y]=ode23S('dy1',tspan,y0);
```

(e)
```
>> [t,y]=ode23TB('dy1',tspan,y0);
```