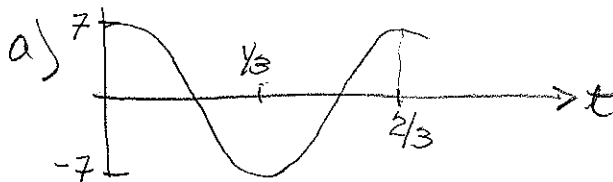


1. $y(t) = 7 \cos 3\pi t$



b) $|\cos d| \leq 1 \Rightarrow |y| \leq 7$

Max of $\cos d$ at $d = 0, 2\pi, 4\pi, \dots \Rightarrow$ max of y at $3\pi t = 0, 2\pi, 4\pi, \dots$
 $\Rightarrow$ Max " " " $t = 0, \frac{2}{3}, \frac{4}{3}, \dots$

c) Period of $\cos d$ is $2\pi \Rightarrow$ period of $\cos 3\pi t$ is $3\pi T = 2\pi \Rightarrow T = \frac{2}{3}$

d) $y'' = -7 \cdot 9\pi^2 \cos 3\pi t \Rightarrow y'' + 9\pi^2 y = 7[-9\pi^2 + 9\pi^2] \cos 3\pi t = 0$
 $\uparrow$ could be any const. A

2) a) $\int \frac{du}{u} = \ln|u| + C$

b) $\int e^u du = e^u + C$

c) $\int \frac{dx}{1+4x} = \frac{1}{4} \int \frac{du}{u} = \frac{1}{4} \ln|1+4x| + C$ (use a)
 $u = 1+4x$
 $du = 4dx$

d) $\int e^{3t-1} dt = \frac{1}{3} \int e^u du = \frac{1}{3} e^{3t-1} + C$ (use b)
 $u = 3t-1, du = 3dt$

e) $\int t e^{3t^2-1} dt = \frac{1}{6} \int e^u du = \frac{1}{6} e^{3t^2-1} + C$ (use b)
 $u = 3t^2-1, du = 6t dt$

f) $\int (1-v)^{-2} dv = - \int u^{-2} du = +u^{-1} + C = \frac{1}{1-v} + C$
 $u = 1-v, du = -dv$

(g) Same as c) $\int \frac{dv}{g + kv/m} = \frac{m}{k} \int \frac{du}{u} = \frac{m}{k} \ln|g + \frac{kv}{m}| + C$
 $u = g + kv/m, du = k dv/m$

3) $e^{kt+C_1} = e^{kt} e^{C_1} = C e^{kt} \Rightarrow C = e^{C_1}$

4) $e^{\ln|y|} = e^{kt+C} \Rightarrow |y| = e^C e^{kt} \Rightarrow y = \pm e^C e^{kt}$

5) Same as 4: $y = \frac{m}{k} (-g \pm e^{kt/m+C})$

6) $y = e^{rt} \Rightarrow r^2 e^{rt} + r e^{rt} - 2e^{rt} = 0 \Rightarrow (r+2)(r-1) = 0 \Rightarrow r = -2, 1 \Rightarrow$

e^{-2t}, e^t are sol's