

Quiz Review 1 Worksheet  
September 11, 2015

1. Solve the initial value problem  $\frac{1}{\sin(t)} \frac{dy}{dt} + \frac{1}{t \sin(t)} y = 3 \cot(2t)$ ,  $y(\pi/2) = -\frac{3}{2\pi}$ ,  $t \in (0, \pi)$ .

(a) Put the equation in the form  $\frac{dy}{dt} + p(t)y = g(t)$ .

(b) Find the integrating factor  $\mu(t)$  such that  $\frac{d}{dt}(\mu(t)y(t)) = \mu(t)g(t)$  using  $\mu(t) = \exp\left(\int p(t) dt\right)$ .

(c) Integrate to solve  $\mu(t)y(t) = \int \mu(t)g(t) dt + C$ .

(d) Solve for  $y = \frac{1}{\mu(t)} \left[ \mu(t)y(t) = \int \mu(t)g(t) dt + C \right]$ .

(e) Plug in the initial condition  $y(0) = 0$  to solve for  $C$ .

2. Solve the IVP  $\frac{1}{\cos t} \frac{dy}{dt} + \frac{1}{t \cos t} y = 3 \tan(2t)$ ,  $y(\pi) = 0$ ,  $t \in (\pi/2, 3\pi/2)$ .

(a) Put the equation in the right form.

(b) Find the integrating factor.

(c) Integrate.

(d) Solve for  $y(t)$ .

(e) Use the initial condition to get the final solution.