

Name: _____

Mark: _____

Mini-math Div 3/4: Monday, March 1, 2021 (15 minutes)

1. Evaluate the following definite integrals.

(a) (2 points) $\int_1^9 \frac{\sqrt{t} + 1}{t} dt$

Solution:

$$\begin{aligned}\int_1^9 \frac{\sqrt{t} + 1}{t} dt &= \int_1^9 (t^{-1/2} + t^{-1}) dt \\ &= \left[2t^{1/2} + \ln |t| \right]_1^9 \\ &= 2(\sqrt{9} - \sqrt{1}) + \ln 9 - \ln 1 \\ &= 4 + \ln 9\end{aligned}$$

(b) (2 points) $\int_0^{\pi/6} (\cos \theta - \sec^2 \theta) d\theta$

Solution:

$$\begin{aligned}\int_0^{\pi/6} (\cos \theta - \sec^2 \theta) d\theta &= [\sin \theta - \tan \theta]_0^{\pi/6} \\ &= \frac{1}{2} - \frac{1}{\sqrt{3}}\end{aligned}$$

(c) (2 points) $\int_{-\pi/6}^{\pi/6} \sin 2x dx$

Solution: Since $\sin 2x$ is odd and the interval is symmetric, $\int_{-\pi/6}^{\pi/6} \sin 2x dx = 0$.
Otherwise,

$$\int_{-\pi/6}^{\pi/6} \sin 2x dx = -\frac{1}{2} \cos 2x \Big|_{-\pi/6}^{\pi/6} = -\frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} \right) = 0$$