

## Quiz 1

Name: \_\_\_\_\_ Section and/or TA: \_\_\_\_\_

Answer all questions in a clear and concise manner. Unsupported answers will receive no credit.

1. (2 points) Find  $\int_0^{2\pi} t \sin(2t) dt$  using integration by parts. Be sure to show your work.

**Solution:** Set  $u = t$ ,  $dv = \sin(2t)dt$  so  $du = dt$  and  $v = -\frac{1}{2} \cos(2t)$ . Then

$$\begin{aligned}\int_0^{2\pi} t \sin(2t) dt &= -\frac{t^2}{2} \cos(2t) \Big|_0^{2\pi} - \frac{1}{2} \int_0^{2\pi} \cos(2t) dt \\ &= -\frac{t^2}{2} \cos(2t) \Big|_0^{2\pi} - \frac{1}{4} \sin(2t) \Big|_0^{2\pi} \\ &= \frac{-2\pi}{2} + 0 = -\pi\end{aligned}$$

2. (2 points) Make a substitution and then use integration by parts to integrate  $\int e^{\sqrt{x}} dx$

**Solution:** First make the substitution  $u = \sqrt{x}$  so that  $2\sqrt{x} du = dx$  to get  $\int 2ue^u du$ . Then set  $w = 2u$ ,  $dv = e^u$ , so  $dw = du$ , and  $v = e^u$ . Then

$$\begin{aligned}\int 2ue^u du &= 2ue^u - 2 \int e^u du \\ &= 2ue^u - 2e^u \\ &= 2e^u(u - 1) = 2e^{\sqrt{x}}(\sqrt{x} - 1)\end{aligned}$$