

## Math 142, Test2, practice problems

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1. Evaluate  $\int e^{\cos t} \sin t dt$ . **Ans.**  $-e^{\cos t} + C$ .

2. Evaluate  $\int_0^1 \frac{1+4x}{\sqrt{1+x+2x^2}} dx$ . **Ans.** 2.

3. Find the area of the region bounded by

$$y = \sin x, \quad y = e^x \quad x = 0, \quad x = \frac{\pi}{2}.$$

**Ans.**  $e^{\frac{\pi}{2}} - 2$ .

4. Find the area of the region enclosed by

$$x = 2y^2, \quad x + y = 1.$$

**Ans.**  $\frac{9}{8}$ .

5. Find the volume of the solid obtained by rotating about  $y = 1$  the region enclosed by  $y = x$  and  $y = x^2$ . **Ans.**  $\frac{\pi}{5}$ .

6. Use the method of cylindrical shells to find the volume of the solid obtained by rotating the region bounded by the given curves about the  $x$ -axis.

$$x = 1 + y^2, \quad x = 0, \quad y = 1, \quad y = 2.$$

**Ans.**  $\frac{21\pi}{2}$ .

7. Find the average value,  $f_{\text{ave}}$  of the function  $f(x) = \sec x \tan x$  on  $[0, \frac{\pi}{4}]$ . **Ans.**  $\frac{4}{\pi}(\sqrt{2} - 1)$ .

8. Consider the function  $f(x) = (x - 3)^2$  on  $[2, 5]$ . Find  $c$  in  $[2, 5]$  such that  $f(c) = f_{\text{ave}}$ . **Ans.**  $c = 2, 4$ .

9. Use the integration by parts to solve  $\int e^x \cos x dx$ . **Ans.**  $\frac{1}{2}e^x(\cos x + \sin x) + C$ .

10. Use the integration by parts to solve  $\int_1^2 \frac{\ln x}{x^2} dx$ . **Ans.**  $\frac{1}{2} - \frac{1}{2} \ln 2$ .