Math 252 (Bueler): Quiz 5 **15 February 2024**

Name: _____ / **25**

30 minutes. No aids (book, notes, calculator, internet, etc.) are permitted. Show all work and use proper notation for full credit. Put answers in reasonably-simplified form. 25 points possible.

1. [18 points] Compute the following integrals.

a. $\int x e^{-x}\,dx =$

b. $\int_1^3 x \ln x\,dx =$

c. $\int \cos x\, e^{-\sin x}\,dx =$

d. $\displaystyle\int \cos^4 w \sin^3 w\, dw =$

e. $\displaystyle\int \tan^2 x \sec^2 x\, dx =$

f. $\displaystyle\int e^x \sin x\, dx =$

2. [7 points] Sketch the region between $y = \sin x$ and the x-axis on the interval $0 \leq x \leq \pi$. Find the volume of the solid which results by rotating the region around the x-axis. (*Hint. Use disks.*)

Extra Credit. [1 point] Assume n is a large integer. One of these indefinite integrals is much easier than the other. Circle the **easier** one, and do it.

$$\int \sec^n x \tan x \, dx \qquad\qquad \int \tan^n x \sec x \, dx$$

You may find the following **trigonometric formulas** useful. Other formulas, not listed here, should be in your memory, or you can derive them from the ones here.

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$\sin(ax)\sin(bx) = \frac{1}{2}\cos((a-b)x) - \frac{1}{2}\cos((a+b)x)$$

$$\sin(ax)\cos(bx) = \frac{1}{2}\sin((a-b)x) + \frac{1}{2}\sin((a+b)x)$$

$$\cos(ax)\cos(bx) = \frac{1}{2}\cos((a-b)x) + \frac{1}{2}\cos((a+b)x)$$

BLANK SPACE