

Name: \_\_\_\_\_

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30 minutes maximum. 25 possible points. No aids (book, calculator, etc.) are permitted Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form.

Trigonometric Identities

$$\begin{aligned}\sin^2(x) &= \frac{1}{2}(1 - \cos(2x)) & \sin(ax) \cos(bx) &= \frac{1}{2}(\sin((a-b)x) + \sin((a+b)x)) \\ \cos^2(x) &= \frac{1}{2}(1 + \cos(2x)) & \sin(ax) \sin(bx) &= \frac{1}{2}(\cos((a-b)x) - \cos((a+b)x)) \\ & & \cos(ax) \cos(bx) &= \frac{1}{2}(\cos((a-b)x) + \cos((a+b)x))\end{aligned}$$

1. [10 points] Evaluate the definite integrals below:

a.  $\int_{1/3}^{1/2} \cot(\pi x) dx$

b.  $\int_1^4 \sqrt{x} \ln(x) dx$

2. [15 points] Evaluate the definite integrals

a.  $\int \cos^2(4x) dx$

**b.**  $\int \arctan(x) dx$

**c.**  $\int \tan^3(x) \sec^4(x) dx$

**d.**  $\int \frac{dx}{x \ln(x)}$

**e.**  $\int x^2 \cos(x) dx$