MTH 174, Quiz #3, Spring 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Integrate.
   a. $\int x^2 \cos x \, dx$

$u = x^2 \quad dv = \cos x \, dx$

$du = 2x \, dx \quad v = \sin x$

$x^2 \sin x - \int 2x \sin x \, dx \qquad u = 2x \quad dv = \sin x \, dx$

$du = 2 dx \quad v = -\cos x$

$x^2 \sin x - \left[2x(-\cos x) - \int -\cos x \cdot 2 dx\right] =$

$\boxed{x^2 \sin x + 2x \cos x - 2 \sin x + C}$

   b. $\int \ln(4 + x^2) \, dx$

$u = \ln(4+x^2) \quad dv = dx$

$du = \frac{1}{4+x^2} \cdot 2x \, dx \quad v = x$

$x \ln(4+x^2) - \int \frac{2x^2}{4+x^2} \, dx$

$x \ln(4+x^2) - 2\int 1 - \frac{4}{4+x^2} \, dx$

$x^2+4 \overline{)\, x^2 \;\; 1}$

$-x^2-4$

-4

$x \ln(4+x^2) - 2\left[x - 4 \cdot \frac{1}{2} \arctan\left(\frac{x}{2}\right)\right] + C$

$= \boxed{x \ln(4+x^2) - 2x + 4 \arctan\left(\frac{x}{2}\right) + C}$