

Quiz 1 — 08/31/17

Name: _____ Section and/or TA: _____

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

1. (2 points) Find $\int x^5 \ln x \, dx$ using integration by parts. Be sure to show your work.

Solution: Set $u = \ln x$, $dv = x^5 dx$ so $du = (1/x) dx$ and $v = x^6/6$. Then

$$\begin{aligned}\int x^5 \ln x \, dx &= \frac{x^6}{6} \ln x - \int \frac{x^6}{6} \frac{1}{x} dx \\ &= \frac{x^6}{6} \ln x - \frac{1}{6} \int x^5 dx \\ &= \frac{x^6}{6} \ln x - \frac{x^6}{36} + C\end{aligned}$$

2. (3 points) Write down the form of the partial fraction decomposition for each of the following rational functions. *Do not* solve for constants and *do not* try to compute any integrals!

(a) (1 point) $\frac{x+2}{(x-1)(x-2)}$

Solution: $\frac{A}{x-1} + \frac{B}{x-2}$

(b) (1 point) $\frac{x+4}{(x-1)(x+1)^2}$

Solution: $\frac{A}{x-1} + \frac{B}{(x+1)^2} + \frac{C}{x+1}$

(c) (1 point) $\frac{x^3-1}{(x^2+4)(x^2-4)}$

Solution: $\frac{Ax+B}{x^2++} + \frac{C}{x+2} + \frac{D}{x-2}$