

Name \_\_\_\_\_

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### Quiz 9

1. Evaluate the definite integral

$$\int_1^2 \frac{x^2 + 1}{x} dx$$

2. Find the derivative of the function

$$f(x) = \int_0^{x+1} te^t dt$$

$$\begin{aligned} \textcircled{1} \quad \int_1^2 \frac{x^2+1}{x} dx &= \int_1^2 \left(x + \frac{1}{x}\right) dx = \left[\frac{x^2}{2} + \ln x\right]_1^2 \\ &= \left(\frac{2^2}{2} + \ln 2\right) - \left(\frac{1^2}{2} + \ln 1\right) \\ &= \frac{3}{2} + \ln 2. \end{aligned}$$

$$\textcircled{2} \quad f(x) = \int_0^{x+1} t e^t dt$$

Put  $g(x) = \int_0^x t e^t dt$  (We have  $g'(x) = x e^x$ )

$h(x) = x+1$  (We have  $h'(x) = 1$ )

Then  $f(x) = g(h(x))$ . By Chain rule,

$$f'(x) = \underbrace{g'(h(x))}_{=x+1} \underbrace{h'(x)}_{=1} = g'(x+1) = (x+1) e^{x+1}.$$