

Name: _____

Quiz 20, section 5.3, Simplify your answers!

1. (2 pts) Evaluate $I = \int_{-1}^2 x^3 - x^2 dx$

$$\begin{aligned}
 &= \left. \frac{x^4}{4} - \frac{x^3}{3} \right|_{-1}^2 = \left(\frac{2^4}{4} - \frac{2^3}{3} \right) - \left(\frac{(-1)^4}{4} - \frac{(-1)^3}{3} \right) \\
 &= \left(4 - \frac{8}{3} \right) - \left(\frac{1}{4} + \frac{1}{3} \right) \\
 &= 4 - \frac{8}{3} - \frac{1}{4} = 1 - \frac{1}{4} = \frac{3}{4}
 \end{aligned}$$

2. (2 pts) Evaluate $I = \int_3^5 \frac{1}{t} - \frac{1}{2} e^t dt$

$$\begin{aligned}
 &= \ln|t| - \frac{1}{2} e^t \Big|_3^5 = \left(\ln|5| - \frac{1}{2} e^5 \right) - \left(\ln|3| - \frac{1}{2} e^3 \right) \\
 &= \ln \frac{5}{3} - \frac{1}{2} (e^5 - e^3)
 \end{aligned}$$

3. (2 pts) Evaluate $I = \int_1^8 \frac{1}{9} x^{1/3} - 9x^{-1/3} dx$

$$= \frac{1}{9} \frac{x^{4/3}}{4/3} - 9 \frac{x^{2/3}}{2/3} \Big|_1^8 = \frac{1}{12} x^{4/3} - \frac{27}{2} x^{2/3} \Big|_1^8$$

$$= \left(\frac{1}{12} 8^{4/3} - \frac{27}{2} 8^{2/3} \right) - \left(\frac{1}{12} - \frac{27}{2} \right)$$

$\downarrow \quad \downarrow$
 $2^4=16 \quad 2^2=4$

$$= \left(\frac{4}{3} - 54 \right) - \left(\frac{1}{12} - \frac{27}{2} \right) = -54 + \frac{16 - 1 + 162}{12}$$

$$= \frac{177}{12} - 54$$

4. (2 pts) Evaluate $I = \int_0^{1/2} \frac{1}{1+x^2} + \frac{1}{\sqrt{1-x^2}} dx$

$$= \tan^{-1} x + \sin^{-1} x \Big|_0^{1/2}$$

$$= \left(\tan^{-1} \frac{1}{2} + \sin^{-1} \frac{1}{2} \right) - \left(\tan^{-1} 0 + \sin^{-1} 0 \right)$$

$$= \tan^{-1} \frac{1}{2} + \frac{\pi}{6}$$

5. (2 pts) Evaluate $I = \int_{\pi}^{3\pi/2} 2 \sin x + 3 \cos x dx$

$$= -2 \cos x + 3 \sin x \Big|_{\pi}^{3\pi/2}$$

$$= \left(-2 \cos \frac{3\pi}{2} + 3 \sin \frac{3\pi}{2} \right) - \left(-2 \cos \pi + 3 \sin \pi \right)$$

$$= (0 - 3) - (2 + 0)$$

$$= -5$$