

N04: Sample Assessment Items

KEY

Possible assessment items include all of the suggested exercises above in textbook, Khan Academy, and class practice exercises.

In addition, consider the following.

Answers/solutions are included at the end of the document.

ITEMS

Use Fundamental Theorem of Calculus Part I to evaluate the following:

$$\begin{aligned} 1. \int_1^e \left(\frac{1}{x} - e^x \right) dx &= \left(\ln|x| - e^x \right) \Big|_1^e \\ &= (\ln|e| - e^e) - (\ln|1| - e^1) \\ &= 1 - e^e - 0 + e = \boxed{1 - e^e + e} \end{aligned}$$

FYI
 ≈ -11.436

$$\begin{aligned} 2. \int_0^1 (x^3 + 5x^2 - 1) dx &= \left(\frac{x^4}{4} + 5 \frac{x^3}{3} - x \right) \Big|_0^1 \\ &= \left(\frac{1}{4} + 5 \cdot \frac{1}{3} - 1 \right) - (0 + 0 - 0) \\ &= \frac{1}{4} + \frac{5}{3} - 1 = \frac{3 + 20 - 12}{12} \end{aligned}$$

$$\begin{aligned} 3. \int_0^\pi (\sin(x)) dx &= \left(-\cos(x) \right) \Big|_0^\pi \\ &= (-\cos(\pi)) - (-\cos(0)) \\ &= \cancel{-(-1)} + 1 = 1 + 1 = \boxed{2} \end{aligned}$$

FYI
 ≈ 0.917

10/14

~~SOLUTIONS~~

~~TO BE ADDED~~

1. $\frac{1}{x^2} = x^{-2}$
 $\frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$

2. $\frac{d}{dx} \ln(x^2) = \frac{1}{x^2} \cdot 2x = \frac{2}{x}$

3. $\frac{d}{dx} \ln(x^2 + 1) = \frac{1}{x^2 + 1} \cdot 2x = \frac{2x}{x^2 + 1}$

4. $\frac{d}{dx} \ln(x^2 - 1) = \frac{1}{x^2 - 1} \cdot 2x = \frac{2x}{x^2 - 1}$

5. $\frac{d}{dx} \ln(x^2 + x + 1) = \frac{1}{x^2 + x + 1} \cdot (2x + 1) = \frac{2x + 1}{x^2 + x + 1}$

6. $\frac{d}{dx} \ln(x^2 - x + 1) = \frac{1}{x^2 - x + 1} \cdot (2x - 1) = \frac{2x - 1}{x^2 - x + 1}$

7. $\frac{d}{dx} \ln(x^2 + 2x + 1) = \frac{1}{x^2 + 2x + 1} \cdot (2x + 2) = \frac{2x + 2}{x^2 + 2x + 1}$

8. $\frac{d}{dx} \ln(x^2 - 2x + 1) = \frac{1}{x^2 - 2x + 1} \cdot (2x - 2) = \frac{2x - 2}{x^2 - 2x + 1}$

9. $\frac{d}{dx} \ln(x^2 + 1) = \frac{1}{x^2 + 1} \cdot 2x = \frac{2x}{x^2 + 1}$

10. $\frac{d}{dx} \ln(x^2 - 1) = \frac{1}{x^2 - 1} \cdot 2x = \frac{2x}{x^2 - 1}$

11. $\frac{d}{dx} \ln(x^2 + x + 1) = \frac{1}{x^2 + x + 1} \cdot (2x + 1) = \frac{2x + 1}{x^2 + x + 1}$

12. $\frac{d}{dx} \ln(x^2 - x + 1) = \frac{1}{x^2 - x + 1} \cdot (2x - 1) = \frac{2x - 1}{x^2 - x + 1}$

13. $\frac{d}{dx} \ln(x^2 + 2x + 1) = \frac{1}{x^2 + 2x + 1} \cdot (2x + 2) = \frac{2x + 2}{x^2 + 2x + 1}$

14. $\frac{d}{dx} \ln(x^2 - 2x + 1) = \frac{1}{x^2 - 2x + 1} \cdot (2x - 2) = \frac{2x - 2}{x^2 - 2x + 1}$

15. $\frac{d}{dx} \ln(x^2 + 1) = \frac{1}{x^2 + 1} \cdot 2x = \frac{2x}{x^2 + 1}$

16. $\frac{d}{dx} \ln(x^2 - 1) = \frac{1}{x^2 - 1} \cdot 2x = \frac{2x}{x^2 - 1}$

17. $\frac{d}{dx} \ln(x^2 + x + 1) = \frac{1}{x^2 + x + 1} \cdot (2x + 1) = \frac{2x + 1}{x^2 + x + 1}$

18. $\frac{d}{dx} \ln(x^2 - x + 1) = \frac{1}{x^2 - x + 1} \cdot (2x - 1) = \frac{2x - 1}{x^2 - x + 1}$

19. $\frac{d}{dx} \ln(x^2 + 2x + 1) = \frac{1}{x^2 + 2x + 1} \cdot (2x + 2) = \frac{2x + 2}{x^2 + 2x + 1}$

20. $\frac{d}{dx} \ln(x^2 - 2x + 1) = \frac{1}{x^2 - 2x + 1} \cdot (2x - 2) = \frac{2x - 2}{x^2 - 2x + 1}$