BONUS Week 2 Homework

ⓘ This is a preview of the published version of the quiz

Started: Jul 2 at 7:52am

Quiz Instructions

Please answer all the questions below.

Question 1

1 pts

(Lesson 2.1: Derivatives.) BONUS: If $f(x) = \ell n(2x - 3)$, find the derivative $f'(x)$.

- a. $2x$
- b. $\frac{1}{2}\ell n(2x - 3)$
- c. $2/(2x - 3)$
- d. $x/2$

Question 2

1 pts

(Lesson 2.1: Derivatives.) BONUS: If $f(x) = \cos(1/x)$, find the derivative $f'(x)$.

- a. $\cos(1/x^2)$
- b. $\sin(1/x^2)$
- c. $-\frac{1}{x^2}\sin(1/x)$
- d. $\frac{1}{x^2}\sin(1/x)$

Question 3

1 pts

(Lesson 2.2: Finding Zeroes.) BONUS: Suppose that $f(x) = e^{4x} - 4e^{2x} + 4$. Use any method you want to find a zero of $f(x)$, i.e., x such that $f(x) = 0$.

- a. $x = 0$
- b. $x = 1$
- c. $x = ln(2) = 0.693$
- d. $x = \frac{1}{2}ln(2) = 0.347$

(0.347, 0)

plot using Desmos

Question 4

1 pts

(Lesson 2.3: Integration.) BONUS: Find $\int_0^1 (2x+1)^2 dx$.

- a. 1/2
- b. 7/2
- c. 7/3
- d. 13/3

$$\int_0^1 4x^2 + 4x + 1 \, dx$$

$$= \left[\frac{4x^3}{3} + \frac{4x^2}{2} + x\right]_0^1$$

$$\frac{(2x+1)^3}{6}\Big|_0^1 = \frac{27}{6} - \frac{1}{6}$$

Question 5

1 pts

(Lesson 2.3: Integration.) BONUS: Find $\int_1^2 e^{2x} dx$.

- a. 1
- b. $e^2 - e$
- c. 23.6
- d. 46.2

$$\frac{e^{2x}}{2}\Big|_1^2 = 23.6$$

Question 6

1 pts

(Lesson 2.3: Integration.) BONUS: Find $\lim_{x \to 0} \frac{\sin(x) - x}{x}$.

l'hopital

$\frac{\cos x - 1}{1} = 0$

- a. 1
- b. 0 ✓
- c. ∞
- d. undetermined

Question 7

1 pts

(Lesson 2.4: Numerical Integration.) BONUS: Find the approximate value of the integral $\int_0^2 (x-1)^2 dx$ using the lesson's form of the Riemann sum with $f(x) = (x-1)^2, a = 0, b = 2$, and $n = 4$.

- a. -2
- b. 1/3
- c. 3/4 ✓
- d. 3

$\frac{b-a}{n} \sum_{i=1}^{n} f\left(a + \frac{i(b-a)}{n}\right)$

$= \frac{2}{4} \sum_{i=1}^{4} \left(\frac{2i}{4} - 1\right)^2$

$= \frac{1}{2}\left[\frac{1}{4} + 0 + \frac{1}{4} + 1\right] = \frac{3}{4}$

Question 8

1 pts

(Lesson 2.6: Simulating Random Variables.) BONUS: Suppose U and V are independent Uniform(0,1) random variables. (You can simulate these using the RAND() function in Excel, for instance.) Consider the nasty-looking random variable

$$Z = \sqrt{-2ln(U)}\cos(2\pi V),$$

where the cosine calculation is carried out in radians (not degrees). Go ahead and calculate Z. . . don't be afraid. Now, repeat this task 1000 times (easy to do in Excel) and make a histogram of the 1000 Z's. What distribution does this look like?

- a. Normal
- b. Unif(0,1)
- c. Exponential
- d. Weibull

Not saved Submit Quiz