

Quiz 3
Solutions
Form A

Name:
Date: 16 Nov. 04

Math 110-054
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Read all instructions carefully. Read all the questions first so you can manage your time best. The total time for this quiz is 20 minutes. The quiz will be worth 14 points. You will turn in only the answer sheet, so make sure all your work and answers are on the answer sheet. Put your name at the top of every page.

Watch for trick questions!

Part A

Multiple Choice. (You do not have to show work).

1. (2 points) Solve for x : $\ln(2 - 3x) = \frac{1}{2}$.

Answer choices

- A. $x = -0.117093$ B. $x = 0.117093$ C. $x = \frac{\sqrt{e}-2}{3}$
D. $x = \frac{2-\sqrt{e}}{3}$ E. $x = .0643824$ F. None of these.

Solution

Answer: $x = \frac{2-\sqrt{e}}{3}$. Recall that $\ln(2 - 3x) = \frac{1}{2}$ means, $e^{1/2} = 2 - 3x$. Solve for x .

2. (2 points) Find the domain and range of the function $H(x) = 4^{2-x} + 3$.

Answer choices

- A. Domain: $(2, \infty)$ Range: $(3, \infty)$
B. Domain: $(2, \infty)$ Range: $(-3, \infty)$
C. Domain: $(-\infty, \infty)$ Range: $(0, \infty)$
D. Domain: $(-\infty, \infty)$ Range: $(3, \infty)$
E. Domain: $(-2, \infty)$ Range: $(-3, \infty)$
F. None of these.

Solution

Answer: Domain: $(-\infty, \infty)$ & Range: $(3, \infty)$. The domain is all real numbers. This graph is a shift up by 3 of $y = 4^{2-x}$, which has range $(0, \infty)$, hence H has range $(3, \infty)$.

3. (2 points) Find an explicit expression for the n^{th} term of the sequence: 4, 10, 18, 28, 40, ...

Answer choices

- A. $a_n = 2n(n + 1)$ B. $a_n = n(n + 3)$ C. $a_n = a_{n-1} + 2(n + 1)$
D. $a_n = n(n - 3)$ E. $a_n = n(n + 1)$ F. None of these.

Solution

Answer: $a_n = n(n + 3)$. A recursive formula for the sequence could be $a_n = a_{n-1} + 2(n + 1)$, but the question asks for an explicit expression. Do this one by process of elimination. You can immediately throw out $a_n = n(n - 3)$ and $a_n = n(n + 1)$, since $a_1 = 4$. Then check the remaining two choices for the remaining terms.

4. (2 points) What is the domain of $y = 10 - \log_7(5n - 230)$?

Answer choices

- A. $(-\infty, 230]$ B. $[46, \infty)$ C. $(46, \infty)$
D. $(230, \infty)$ E. $(-\infty, 48)$ F. None of these.

Solution

Answer: $(46, \infty)$. The function has a vertical asymptote when $5n - 230 = 0$, so the domain is either $(46, \infty)$ or $(-\infty, 46)$. Check $n = 0$ —if the expression makes sense, the domain is $(-\infty, 46)$. If not (which is the case), then the domain is $(46, \infty)$.

5. (2 points) Solve for the variable in each equation: $\log_2 x = 5$ and $\log_2 32 = w$. The two solutions are:

Answer choices

- A. $x = \sqrt{5}$ and $w = \sqrt{32}$ B. $x = 25$ and $w = 5$ C. $x = 32$ and $w =$
D. $x = 2.32193$ and $w = 4, 294, 967, 296$ E. $x = \frac{5}{\log_2}$ and $w = \log_2 32$ F. None of these

Solution

Answer: $x = 32$ and $w = 5$. $2^5 = 32$, so $x = 32$. $2^w = 32$, so $w = 5$.

6. (2 points) Find the x -intercept of the graph of $y = \ln(x - a) + 2$.

Answer choices

- A. $(\ln(-a) + 2, 0)$ B. $(-2 + \ln a, 0)$ C. $(e^{-2 + \ln a}, 0)$
D. $(e^{-2} + a, 0)$ E. No x -intercept. F. None of these.

Solution

Answer: $e^{-2} + a$. Set $y = 0$, so $\ln(x - a) + 2 = 0$. Rewrite to get $\ln(x - a) = -2$. This is $e^{-2} = x - a$, so solving for x , $x = e^{-2} + a$.

7. (2 points) Find the 4th term of a sequence if $a_1 = 3$ and $a_n = 2 - a_{n-1}$.

Answer choices

- A. -1 B. 3 C. 2
D. 1 E. 0 F. None of these.

Solution

Answer: -1. Find $a_2 = -1$, $a_3 = 3$, and $a_4 = -1$.