Quiz 1

Name:

2017/01/20

This quiz has 5 questions worth 14 points on 2 pages. Try to do as many questions as possible. You can use your calculator.

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1. (4 points) Find the slope and y-intercept of following functions:

   - $2y + 5x - 8 = 0$
   - $12x = 6y + 4$

   Solution: Rewrite them as

   - $y = -\frac{5}{2}x + 4$. So slope $= -\frac{5}{2}$ and y-intercept $= 4$
   - $y = 2x - \frac{2}{3}$. So slope $= 2$ and y-intercept $= -\frac{2}{3}$

2. (2 points) If a power function passes through $(0, 2)$ and $(2, 18)$, please find a possible formula for this function.

   Solution:

3. (4 points) Mark following functions with 'Odd', 'Even' or 'Neither'

   - $(x + 2)^2 - (x^2 + 2^2)$
   - $\ln(\frac{x+1}{x-1})$
   - e^{x^2}
   - $\cos(x^3 + 1)$

   Solution:

   - $(x + 2)^2 - (x^2 + 2^2) = x^2 + 4x + 4 - x^2 - 4 = 4x$ Odd.
   - Let $f(x) = \ln(\frac{x+1}{x-1})$, then $f(-x) = \ln(\frac{-x+1}{-x-1}) = \ln(\frac{x-1}{x+1}) = -\ln(\frac{x+1}{x-1}) = -f(x)$. Odd.
   - $e^{(-x)^2} = e^{x^2}$. Even
   - Neither.

4. (2 points) Solve the equation $e^{\log(x)} = 10^{\ln(10)}$

Solution: Apply ln to both side we get

$$\log(x) = \ln(10^{\ln(10)}) = \ln(10) * \ln(10) = (\ln(10))^2$$

So $x = 10^{(\ln(10))^2}$

5. (2 points) (Bonus Question) Solve the equation $e^{\log(x)} = 10^{\ln(2x)}$. Your answer must be exact.

Solution: Apply ln to both sides we get $\log(x) = \ln(2x) \times \ln(10)$. Now notice that $\log(x) = \log(e^{\ln(x)}) = \ln(x) \times \log(e)$, so we have

$$\ln(x)\log(e) = \ln(10)(\ln(x) + \ln(2))$$

So $\ln(x) = \frac{\ln(10)\ln(2)}{\log(e)-\ln(10)} \Rightarrow x = e^{\frac{\ln(10)\ln(2)}{\log(e)-\ln(10)}}$.