

TRUE OR FALSE QUESTIONS

Note: This assignment will be graded as 1 point for each correct answer, 0 points for no answer, and -1 points for each wrong answer. It is therefore quite possible to get a **negative** score. (I will not normally do this on true/false questions, but I want you to take this assignment seriously.)

Answer the questions exactly as they are stated. All numbers are to be real.

1. F $\frac{x^2 + 5}{x^2 + 7}$ can't be simplified. If you put $x = 1$, you get $\frac{6}{8} \neq \frac{5}{7}$.
2. F Let $a = \log(x)$ and $b = \log(y)$. Then claiming that $\log(x)\log(y) = \log(x) + \log(y)$ is the same as claiming that $ab = a + b$, which is obviously false.
3. F $\frac{\pi}{2} \approx 1.570796$, which is nowhere near 90. For example, a semicircle of radius 1 has area $\frac{\pi}{2}$, but certainly does not have area 90. It is true that $\frac{\pi}{2}$ *radians* is 90 *degrees*, but that is not what the problem said.
4. T 10^{-13} is a positive number, because $10^{-13} = 1/10^{13} = 0.0000000000001 > 0$. (There are 12 zeros after the decimal point.)
5. F If $a = x^5 + 2x^4$ and $b = x^2 + 7x - 3$, then
$$a - b = x^5 + 2x^4 - (x^2 + 7x - 3) = x^5 + 2x^4 - x^2 - 7x + 3.$$

The proposed answer, $x^5 + 2x^4 - x^2 + 7x - 3$, has the last two signs incorrect.

6. F $\sec(x) = \frac{1}{\cos(x)}$, not $\cos\left(\frac{1}{x}\right)$.
7. F Among other things, the statement " $\log_2(1/8) = 2^x = 1/8 = x = -3$ " asserts that $1/8 = -3$, which is manifestly false. Please note that the symbol "=" asserts that the two things on each side of it are *equal*. Obviously x can't be equal to both $1/8$ and -3 at the same time; similarly, 2^x can't be equal to both $\log_2(1/8)$ and $1/8$ at the same time. See the comments on the sheet of general instructions for homework, where exactly this statement is used as an example.
8. F $\frac{\log(5x)}{x}$ can't be simplified. If you put $x = 5^4$, you get $\frac{\log(5^5)}{5^4} = \frac{5 \log(5)}{5^4} = \frac{1}{5^3} \cdot \log(5) \neq \log(5)$.
9. F To solve $(x + 1)(x + 2) = 1$, multiply out the left side, move the 1 over to the left, and use the quadratic formula. Factoring only works when the other side is zero. Note that $x + 1 = 1$ gives $x = 0$ and $x + 2 = 1$ gives $x = -1$; neither of these solves the original equation.

10. F

$$\log\left(\frac{x}{yz}\right) = \log(x) - [\log(y) + \log(z)] = \log(x) - \log(y) - \log(z),$$

not $\log(x) - \log(y) + \log(z)$.

11. T If $x < 0$ then $|x| = -x$. This is the definition of absolute value. (Look it up in your precalculus book!) Note that if $x < 0$ then $-x > 0$.

12. F $(1 + y^2 + y^4 + y^6)^2$ has many more terms than $1^2 + (y^2)^2 + (y^4)^2 + (y^6)^2$. The correct answer can be obtained by multiplying out using the distributive law, and is

$$(1 + y^2 + y^4 + y^6)^2 = 1 + 2y^2 + 3y^4 + 4y^6 + 3y^8 + 2y^{10} + y^{12}.$$

13. F $(2x^{1/2})^2 = 2^2(x^{1/2})^2 = 4x$, not $4x^{1/4}$.

14. F $\ln(Ce^{kt}) = \ln(C) + \ln(e^{kt}) = \ln(C) + kt$. The answer given, $kt \ln(Ce)$, is equal to $kt \ln(C) + kt$, which is different unless $C = 1$ or $kt = 1$.

15. F $-\frac{\pi}{2} \neq \frac{3\pi}{2}$. Indeed, $-\frac{\pi}{2} \approx -1.570796$ and $\frac{3\pi}{2} \approx 4.712389$. These are obviously not equal. You have to make two mistakes to believe this one to be true. First, an expression containing π need *not* be an angle. (The volume of a sphere of radius 1 is $\frac{4\pi}{3}$.) Secondly, even angles of $-\frac{\pi}{2}$ radians and $\frac{3\pi}{2}$ radians are not equal; the best you can say is that they have the same terminal side. The distinction is sometimes important. (This will probably be discussed in class.)

16. T If $f(x) = 2 - x$, then $f(1 - x) = 2 - (1 - x) = x + 1$.

17. T The point $(-x, -y)$ is in the first quadrant whenever x and y are both negative. For example, if $x = -2$ and $y = -3$, then $(-x, -y) = (2, 3)$.

18. T For every x , we have $[\sin(x)]^2 + [\cos(x)]^2 = 1$. However,

$$\left(\frac{1}{4}\right)^2 + \left(\frac{3}{4}\right)^2 = \frac{10}{16} = \frac{5}{8} \neq 1.$$

19. F $\frac{1}{x^{1/6} + x^{1/2}}$ is not equal to $x^{-1/6} + x^{-1/2}$. To see this, put for example $x = 1$. Then the first expression is $\frac{1}{2}$ and the second is 2.

20. F $\ln(e^x + e^{-y})$ can't be simplified. (If $x = y = 0$, then $\ln(e^x + e^{-y}) = \ln(2)$ and $x - y = 0$.)

21. F $\log_3\left(\frac{5}{2 + x^2}\right) = \log_3(5) - \log_3(2 + x^2)$, not $\log_3(5) - \log_3(2) + x^2$.

22. T $\frac{1}{k-1} - \frac{1}{k} = \frac{k}{(k-1)k} - \frac{k-1}{(k-1)k} = \frac{1}{(k-1)k} = \frac{1}{k^2 - k}$.

23. F $\sqrt{\cos^2(x) + 1}$ can't be simplified. (If $x = \pi$, then $\sqrt{\cos^2(x) + 1} = \sqrt{2}$ and $\cos(x) + 1 = 0$.)

24. T $\arcsin\left(\frac{\pi}{2}\right)$ is not defined, because $\arcsin(x)$ is defined only for $-1 \leq x \leq 1$, and $\frac{\pi}{2} > 1$.