

Mathletics, 2014 Release Questions BC Calculus

14. A water tank has the shape of a right circular cylinder of altitude 12 feet and radius 6 feet. If water is being pumped into the tank at a rate of 2 cubic feet per minute, approximate the rate (in feet/min) at which the water level is rising when the water is 9.325 feet deep. (nearest thousandth)

- a) 0.018 b) 0.234 c) 0.283 d) 0.325 e) none of these

15. The position of a particle moving along a line is given by $s(t) = 2t^3 - 24ct^2 + 90c^2t + 7$, $t \geq 0$, with 'c' a positive constant. For what values of t is the speed of the particle increasing? Select all that apply.

- a) $0 < t < 3c$ b) $t > 4c$ c) $t > 5c$ d) $t > 0$ e) None of these

16. If you evaluate $\int (2x)^2 e^{5x} dx$, the sum of the numerical coefficients of all terms except the constant of integration is?

- a) .9451 b) .9472 c) -24,560 d) 36,640 e) none of these

17. For what values of x is $f(x) = x^4 + x^3 + 2$ concave up? Select all that apply.

- a) -1 b) -0.667 c) -0.333 d) all real numbers e) $x > 0$

18. The coefficient of the term $a^{5/2}$ in the answer for $\int_a^{a+1} (x-1)\sqrt{x-1} dx$ is what value?

- a) 3/2 b) 1 c) 2/5 d) 0 e) None of these

19. Evaluate $\int \sec^2 x \tan x dx$. Select all that apply.

- a) $(0.5)\sec^2 x + C$ b) $(\frac{1}{6})\sec^3 x \tan^2 x + C$ c) $(0.5)\tan^2 x + C$
d) $\sec^2 x \tan x + C$ e) none of these

20. To evaluate the integral $\int \frac{\sqrt{x^2 + 9}}{x} dx$, a substitution may be made. Which of the following substitutions would eliminate the radical from the integrand? Select all that apply.

- a) $x = \sin(\theta)$ b) $x = 3 \sinh(\theta)$ c) $x = 3 \tan(\theta)$ d) $x = 3 \cos(\theta)$ e) $x = \tan(\theta)$