

Makeup Quiz: Multiple Choice (4 points each)

There is no partial credit. You may not use a calculator.

1. Which of these identities is true?

- (A) $\ln(a^b) = (\ln a)^{\ln b}$
- (B) $\frac{\ln a}{\ln b} = \ln(a - b)$
- (C) $\ln 0 = 1$
- (D) $\ln a - \ln b = \ln(a/b)$ \Leftarrow correct
- (E) $(\ln a)(\ln b) = \ln(a + b)$

2. If $h(x) = f(x)g(x)$ and $f(3) = 4$, $g(3) = 2$, $f'(3) = -1$, and $g'(3) = 5$, then $h'(3) =$

- (A) 18 \Leftarrow correct
- (B) -18
- (C) -5
- (D) 22
- (E) -22

3. Consider the function $f(x) = \begin{cases} 3x - 1 & \text{if } x \leq 2 \\ x^2 + 2 & \text{if } x > 2 \end{cases}$. Which statement is true?

- (A) $f(2)$ is not defined.
- (B) $f(2) = 6$
- (C) $f(x)$ is continuous at $x = 2$.
- (D) $\lim_{x \rightarrow 2^+} f(x) = 6$. \Leftarrow correct
- (E) $\lim_{x \rightarrow 2^-} f(x) = 6$.

4. $\frac{d}{dx}(3x^3 + 2x^2)^{2/5} =$
- (A) $(9x^2 + 4x)^{2/5}(3x^3 + 2x^2)$
- (B) $\frac{2}{5}(9x^2 + 4x)^{1/5}$
- (C) $\frac{2}{5}(9x^2 + 4x)^{-3/5}(3x^3 + 2x^2)$
- (D) $\frac{2}{5}(3x^3 + 2x^2)^{-3/5}$
- (E) $\frac{2}{5}(3x^3 + 2x^2)^{-3/5}(9x^2 + 4x) \Leftarrow$ correct

5. $\lim_{x \rightarrow \infty} \frac{2e^{4x} - 7e^{-x}}{e^{4x} + 1000e^x + 10} =$
- (A) 0
- (B) 1
- (C) 2 \Leftarrow correct
- (D) -1
- (E) $\frac{1}{2}$

6. The function $f(x) = e^x + ex$ is one-to-one. If g is the inverse function of f , then $g'(2e) =$

- (A) $\frac{1}{e^{2e} + 1}$
- (B) $\frac{1}{2e} \Leftarrow$ correct
- (C) $\frac{1}{e + 1}$
- (D) $\frac{1}{1 + \ln 2}$
- (E) Can't be determined from the information given.

7. A spherical snowball is melting in such a way that its volume is decreasing at a rate of $2 \text{ cm}^3/\text{min}$. At what rate is the radius changing when the radius is 5 cm ?

(A) $-\frac{1}{25\pi} \text{ cm/min}$

(B) $-\frac{1}{100\pi} \text{ cm/min}$

(C) $-\frac{1}{10\pi} \text{ cm/min}$

(D) $-\frac{1}{5\pi} \text{ cm/min}$

(E) $-\frac{1}{50\pi} \text{ cm/min} \Leftarrow \text{correct}$

8. $\frac{d}{dx} \int_x^{x^2} \frac{\sin t}{t} dt =$

(A) $\frac{\sin x}{x}(2x - 1)$

(B) $2 \frac{\sin x^2}{x} + \frac{\sin x}{x}$

(C) $2 \frac{\sin x^2}{x} - \frac{\sin x}{x} \Leftarrow \text{correct}$

(D) $2 \frac{\sin x^2}{x}$

(E) $\frac{\sin x^2}{x^2} - \frac{\sin x}{x}$

9. $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{i=1}^n \frac{1}{1 + (i/n)^2} =$

(A) $\int_1^{\infty} \frac{dx}{1 + x^2}$

(B) $\int_0^1 \frac{dx}{1 + x^2} \Leftarrow$ correct

(C) $\lim_{n \rightarrow \infty} \tan^{-1} \left(\frac{1}{n} \right)$

(D) $\int_1^2 \frac{dx}{1 + x^2}$

(E) $\int_0^2 \frac{dx}{1 + x^2}$

10. $\lim_{x \rightarrow 0} (\cot x)^x =$

(A) ∞

(B) 0

(C) -2

(D) $1 \Leftarrow$ correct

(E) Does not exist