1. If $\sec x = 3$ and $\dfrac{3\pi}{2} < x < 2\pi$, then $(\sin x + \cos x) =$

   A. $\dfrac{1}{3}(1+\sqrt{8})$

   B. $\dfrac{1}{3}(1-\sqrt{8})$

   C. $\dfrac{1}{2}(1+\sqrt{8})$

   D. $\dfrac{1}{3}(-1+\sqrt{8})$

   E. $\dfrac{1}{2}(-1-\sqrt{8})$

2. Find the equation of the line which passes through the centers of these two circles:

$$(x-3)^2 + (y+1)^2 = 1 \quad \textit{and} \quad x^2 + y^2 - 4y = 1\,.$$

   A. $y = x + 2$

   B. $y = -2 - x$

   C. $y = 2 - x$

   D. $y = -3x + 2$

   E. $y = -3x$

3. If $f(x) = x^2 + e^{(x+1)}$ and $g(x) = 4x - 1$, then $(f \circ g)(2t) =$

   A. $(2t)^2 + e^{(2t-1)}$

   B. $(4t + 1)^2 + e^{4t}$

   C. $(4t + 1)^2 + e^{(4t+1)}$

   D. $(8t - 1)^2 + e^{(8t-2)}$

   E. $(8t - 1)^2 + e^{8t}$

4. The equation of the function $g(x)$ obtained by shifting the graph of $f(x) = \log_{10} x$ three units vertically down and then reflecting it across the $x$-axis is given by

   A. $g(x) = 3 - \log_{10} x$

   B. $g(x) = -3 - \log_{10} x$

   C. $g(x) = -3 + \log_{10} x$

   D. $g(x) = -\log_{10}(x - 3)$

   E. $g(x) = -\log_{10}(x + 3)$

5. Solve for $x$: $e^{|2x-1|} = 2$.

   A. $x = \frac{1}{2}\ln 2$ and $x = -\frac{1}{2}\ln 2$

   B. $x = 1 + \ln 2$ and $x = \frac{1}{2}(1 + \ln 2)$

   C. $x = \frac{1}{2}(1 + \ln 2)$ and $x = -\frac{1}{2}(1 + \ln 2)$

   D. $x = \frac{1}{2}(1 - \ln 2)$ and $x = \frac{1}{2}(1 + \ln 2)$

   E. $x = \frac{1}{2}\ln 2$

6. The domain of $\ln\left(\dfrac{4x^2}{x+1}\right)$ is

   A. $(1, \infty) \cup (-\infty, -1)$

   B. $(0, \infty) \cup (-\infty, -1)$

   C. $(-1, 0) \cup (0, \infty)$

   D. $(-1, 0]$

   E. All real numbers except $x = 0$ and $x = -1$

7. If $f(x) = \ln(3x - 1)$, find the domain of $f^{-1}$

   A. $(\frac{1}{3}, \infty)$

   B. $(0, \infty))$

   C. $(-\frac{1}{3}, \infty)$

   D. $(1, \infty)$

   E. $(-\infty, \infty)$

8. Compute $\lim_{x \to 2^-} \dfrac{x^2 - x - 2}{(x-2)^2}$

   A. $\infty$

   B. $-\infty$

   C. $0$

   D. $1$

   E. $-1$

9. Compute $\lim_{t \to 0} \dfrac{\sqrt{2+t} - \sqrt{2-t}}{t}$

A. 2

B. $\dfrac{1}{2\sqrt{2}}$

C. $\frac{1}{2}$

D. $\dfrac{1}{\sqrt{2}}$

E. $\sqrt{2}$

10. Let $G(x) = \begin{cases} 1 - x & \text{if } x < 0 \\ x + x^2 & \text{if } 0 \leq x < 1 \\ 2 - x & \text{if } x \geq 1 \end{cases}$. Then $G$ is discontinuous

A. Only at 0

B. Only at 1

C. Only at 0 and 1

D. Only at $-1, 0$, and 1

E. The function is continuous everywhere

11. Consider the statements

I. If $\lim_{x\to a^+} f(x) = \lim_{x\to a^-} f(x)$, then $f$ is continuous.

II. If $f$ is continuous at $b$, then $f(b)$ does not have to be defined.

III. The function $g(x) = \sqrt{1-x^2}$ is continuous only on $(-1, 1)$.

Which are true?

A. I

B. I,II

C. II, III

D. II

E. None are true

12. Compute $\lim_{x\to\infty} \dfrac{2x-5x^2}{\sqrt{4x^2+9}}$

A. $-\dfrac{5}{2}$

B. 1

C. $-\dfrac{5}{4}$

D. $\dfrac{1}{2}$

E. $-\infty$

13. What is the total number of horizontal and vertical asymptotes for the function $\dfrac{x^2 - x}{4 - x^2}$?

A. 3

B. 4

C. 2

D. 1

E. 0

14. Compute $\lim\limits_{x \to 2} e^{\left(\dfrac{x^2+1}{2x+1}\right)}$

A. $e^{\frac{3}{5}}$

B. $\infty$

C. $e$

D. $e^{\frac{4}{5}}$

E. $\dfrac{4e}{5}$