MA 161 & 161E EXAM 2

1. If $f(x) = \dfrac{2x-1}{x-1}$, then $f'(x) =$

A. $\dfrac{4x-3}{(x-1)^2}$

B. $\dfrac{-1}{(x-1)^2}$

C. $\dfrac{-x-1}{(x-1)^2}$

D. $\dfrac{3x-2}{(x-1)^2}$

E. $\dfrac{4x-2}{x-1}$

2. If $f(x) = \ln(\ln x)$, then $f'(e) =$

A. -1

B. 0

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

D. 1

E. e

3. If $f(x) = e^{x^2} \cos 3x$, then $f''(0) =$

A. 11

B. 2

C. 0

D. -1

E. -7

4. The slope of the line tangent to $x^2 + x^2y^2 + y^3 = 3$ at $(1, 1)$ is

A. $-\frac{4}{5}$

B. $-\frac{3}{5}$

C. $-\frac{2}{5}$

D. $-\frac{1}{5}$

E. 0

5. A spherical balloon is losing air at the rate of 2 ft^3/min. How fast is the radius of the balloon shrinking when the radius is 4 ft?

A. $\frac{1}{32\pi}$ ft/min

B. $\frac{1}{2\pi}$ ft/min

C. 2π ft/min

D. 32π ft/min

E. $\frac{3}{2\pi}$ ft/min

6. Using a linear approximation to

$y = x^{\frac{4}{3}}$ at $x = 8$, $(7.5)^{\frac{4}{3}} \approx$

A. $15\frac{2}{3}$

B. $15\frac{1}{3}$

C. 15

D. $14\frac{2}{3}$

E. $14\frac{1}{3}$

7. $f(x) = 2x^3 + 3x^2 - 12x$ on the interval $[0, 2]$ has

A. maximum value of 20,
minimum value of 0

B. maximum value of 20,
minimum value of -7

C. maximum value of 4
minimum value of 0

D. maximum value of 8
minimum value of -4

E. maximum value of 4
minimm value of -7

8. For a certain function f with $f'(x) = -2(3x+1)(x-2)$, the interval(s) on which $f(x)$ is increasing is (are)

A. $x < 2$

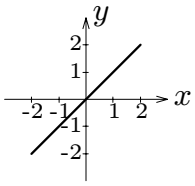
B. $x > -\frac{1}{3}$

C. $-\frac{1}{3} < x < 2$

D. $x < -\frac{1}{3}$ or $x > 2$

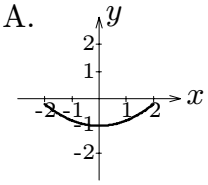
E. $x < -\frac{1}{3}$

9. The following is a graph of f' for $-2 \leq x \leq 2$

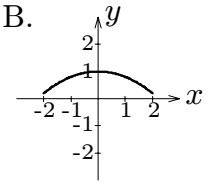


which of the following could be a graph of f?

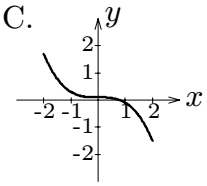
A.



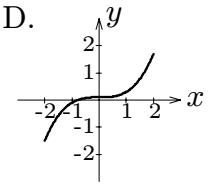
B.



C.



D.



E. More information is needed to determine the graph of f.

10. Let $f'(x) = x^2 + x - 2$. First find $f(x)$ so that $f(1) = 0$. Then $f(2)$ is

A. $\frac{7}{6}$

B. 4

C. 0

D. $-\frac{1}{6}$

E. $\frac{11}{6}$

11. A population is growing exponentially. It was 250 twenty four years ago and 500 eight years ago. How large is it now? ($\sqrt{2} \approx 1.414$)

A. 707

B. $500e^{0.8}$

C. 750

D. $120e^{24}$

E. 1359

12. The function $f(x) = 4x^2 - \frac{1}{x}$ has

A. a relative maximum at $x = \frac{1}{2}$

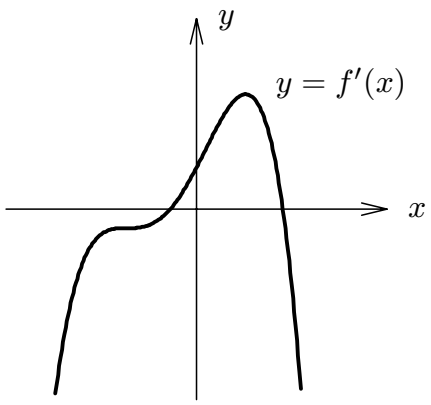
B. a relative minimum at $x = -\frac{1}{2}$

C. a relative maximum at $x = \frac{1}{2}$

D. a relative minimum at $x = \frac{1}{2}$

E. No extreme values

13. Given the following graph of $f'(x)$ we see that $f(x)$ has



A. one relative maximum and no relative minimum

B. no relative maximum and one relative minimum

C. one relative maximum and one relative minimum

D. no relative maximum and two relative minima

E. one relative maximum and two relative minima

14. The concentration of a drug in the blood stream t seconds after injection into a muscle is given by

$y = 14(e^{-0.01t} - e^{-0.01et}), \quad t \geq 0. \qquad (e \approx 2.718)$

Then the concentration is increasing least rapidly after

A. 58 sec

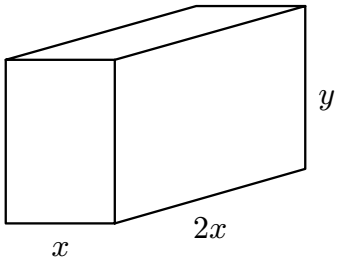
B. 14 sec

C. 1400 sec

D. 272 sec

E. 117 sec

15. A crate has 4 rectangular sides, rectangular top and bottom, twice as long as they are wide, and a volume V. If the crate has the smallest possible surface area, the width of the base is



A. $\sqrt[3]{\frac{3V}{2}}$

B. $\frac{\sqrt[3]{3V}}{2}$

C. $\sqrt[3]{V}$

D. $\frac{\sqrt[3]{V}}{2}$

E. $\frac{\sqrt[3]{V}}{3}$