

1. The derivative of $y = x^{\cos x}$ at $x = \frac{\pi}{2}$ is:

a. $-\ln \frac{\pi}{2}$

b. $-\frac{\pi}{2} \ln \frac{\pi}{2}$

c. -1

d. $\frac{-\pi}{2}$

e. $\frac{\pi}{2}$

2. A bacteria culture starts with 200 bacteria and grows at a rate proportional to its size. After 2 hours there were 400 bacteria. Find the number of bacteria after 6 hours.

a. 800

b. 1200

c. 1600

d. 2000

e. 2400

3. The value of $\sinh(\ln 3)$ is:

- a. $\frac{2}{3}$
- b. 0
- c. 3
- d. $\frac{5}{3}$
- e. $\frac{4}{3}$

4. A ladder 8 feet long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a speed of 2 feet/sec., how fast is the angle between the top of the ladder and the wall changing when this angle is $\frac{\pi}{6}$?

- a. $\frac{1}{2\sqrt{3}}$ rad/sec
- b. $\frac{1}{2}$ rad/sec
- c. $\frac{1}{4}$ rad/sec
- d. $\frac{1}{8}$ rad/sec
- e. $\frac{\sqrt{3}}{8}$ rad/sec

5. Using differentials or a linear approximation, the approximate value of $\sqrt[4]{79}$ is:

a. $\frac{323}{108}$

b. $\frac{325}{108}$

c. $\frac{11}{4}$

d. $\frac{161}{54}$

e. $\frac{163}{54}$

6. $f(x) = x^2 e^{-x^2}$ is increasing on the interval(s)

a. $(-\infty, -2)$ and $(0, 2)$

b. $(0, 2)$

c. $(0, 1)$

d. $(-\infty, -1)$ and $(0, 1)$

e. $(-2, 1)$

7. $g(x) = \ln(x^2 + 4)$ is concave up on the interval(s)

- a. $(-\infty, 2)$ and $(2, \infty)$
- b. $(-2, 0)$ and $(0, 2)$
- c. $(-2, 2)$
- d. $(-4, 0)$ and $(0, 4)$
- e. $(-4, 4)$

8. The local maxima for the function $f(x) = x + 2 \cos x$ on the interval $(-\pi, \pi)$ occur at

- a. $x = \frac{\pi}{6}$
- b. $x = \frac{\pi}{3}$
- c. $x = -\frac{\pi}{6}$
- d. $x = \frac{5\pi}{6}$
- e. $x = \frac{\pi}{6}$ and $x = \frac{5\pi}{6}$

9. The absolute maximum value for $f(x) = x^3 - 12x + 1$ on $[-1, 3]$ is

a. 17

b. 12

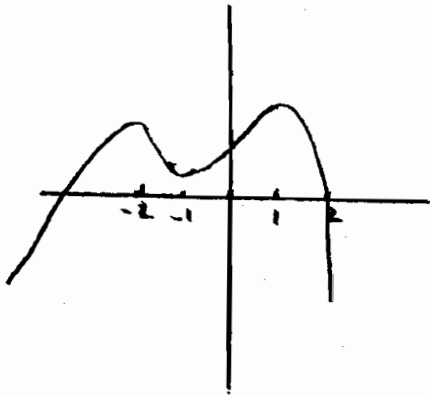
c. 10

d. 1

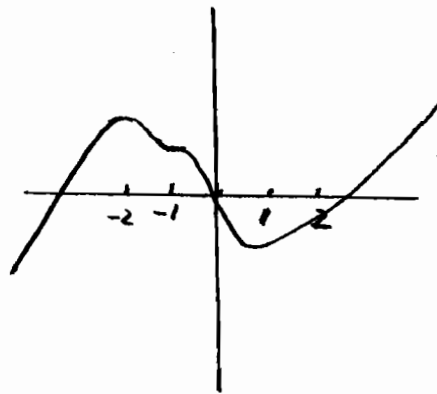
e. 14

10. If $f'(x) = (x + 1)^2(x - 1)(x + 2)$, which of the following could be the graph of f ?

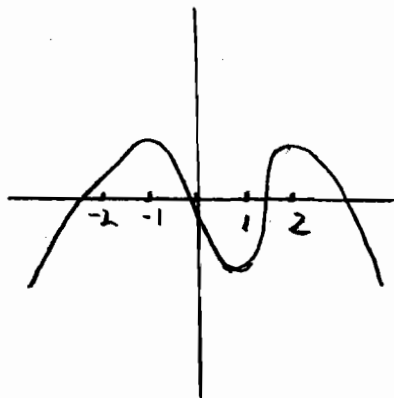
a.



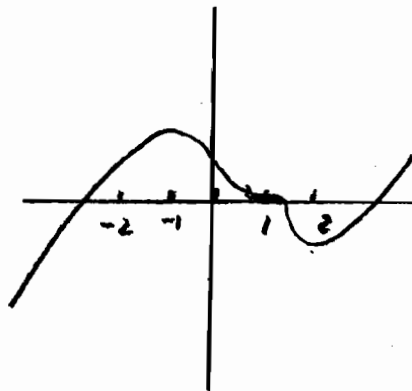
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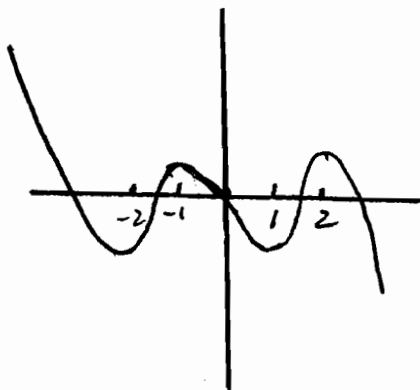
c.



d.



e.



11. $\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$

- a. 3
- b. $-\frac{1}{3}$
- c. 6
- d. $-\frac{1}{6}$
- e. does not exist

12. $\lim_{x \rightarrow 0^+} \left(1 + \frac{2}{x}\right)^{2x}$

- a. 0
- b. 1
- c. e^2
- d. e^4
- e. e^{-2}