1. Find y' if $y = 2(4x^3 - x)(x - 1)$.

A. $y' = 24x^2 - 2$

B. $y' = 12x^3 - 12x^2 - x + 1$

C. $y' = 8x^3 - 8x^2 - 4x$

D. $y' = 8x^3 - 24x^2 + 2$

E. $y' = 32x^3 - 24x^2 - 4x + 2$

2. Find f': $f(x) = \dfrac{x^2 + 3x - 4}{3x - 1}$

A. $f'(x) = \dfrac{3x^2 - 2x - 15}{(3x - 1)^2}$

✓ B. $f'(x) = \dfrac{3x^2 - 2x + 9}{(3x - 1)^2}$

C. $f'(x) = \dfrac{-3x^2 + 2x + 15}{(3x - 1)^2}$

D. $f'(x) = \dfrac{-3x^2 + 2x - 9}{(3x - 1)^2}$

E. $f'(x) = \dfrac{-3x^2 - 2x - 15}{(3x-1)^2}$

3. Find f' : $f(x) = \left(\dfrac{3x-4}{5x+3}\right)^4$

A. $f'(x) = \dfrac{44(3x-4)^3}{(5x+3)^6}$

B. $f'(x) = \dfrac{116(3x-4)^3}{(5x+3)^6}$

C. $f'(x) = \dfrac{-44(3x-4)^3}{(5x+3)^5}$

✓ D. $f'(x) = \dfrac{116(3x-4)^3}{(5x+3)^5}$

E. $f'(x) = \dfrac{-116(3x-4)^3}{(5x+3)^6}$

4. Find the equation of the tangent line to the graph of $f(x) = 1 + x\sin x$ when $x = \dfrac{\pi}{2}$.

A. $y = x + \pi + 1$

B. $y = x + \dfrac{\pi}{2}$

✓ C. $y = x + 1$

D. $y = 2x - \frac{\pi}{2} + 1$

E. $y = 2x + 1$

5. Find $\lim_{x \to \infty} \frac{2x^2 - x + 1}{5x^3 + 3x + 2}$

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

B. $\frac{2}{5}$

✓C. 0

D. $-\frac{1}{3}$

E. Does Not Exist

6. Find $f''(2)$ if $f(x) = (x^2 - 3)^3$

A. 3

B. 96

C. 6

✓D. 102

E. 90

7. Let $f(u)=\dfrac{u+1}{u-1}$, and $g(x)=u=x^2$. Find $(f\circ g)'(2)$.

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

B. $-\frac{2}{9}$

✓C. $-\frac{8}{9}$

D. 0

E. 12

8. Given $f(x)=x^4-4x^3$, please choose the correct statement about its relative Max/Min.

A. There are 2 relative max and 1 relative min.

B. There is no relative max or min.

C. There are 1 relative max and 1 relative min.

D. There is only 1 relative min.

E. There is only 1 relative max.

9. The population P, in thousands, of a small city is given by

$$P(t) = 10 + \frac{5t}{t^2 + 16}$$

Where t is the time, in years. What is the growth rate at $t = 2$ yr.

A. $\frac{21}{2}$ thousands/yr

B. $\frac{7}{20}$ thousands/yr

C. $\frac{3}{20}$ thousands/yr

D. $-\frac{7}{20}$ thousands/yr

E. $-\frac{3}{20}$ thousands/yr

10. Given $f(x) = x + \frac{16}{x}$, choose the correct statement about its critical point.

A. There is no critical point.
B. There is one critical point.
C. There are two critical points.
D. There are three critical points.
E. There are four critical points.

11. Given $f(x) = \frac{x}{x-2}$, choose the correct statement about its Inflection Point.

A. There is no inflection point.
B. There is one inflection point.
C. There are two inflection points.
D. There are three inflection points.
E. There are four inflection points.

12. Given $f(x) = \frac{3x-1}{x+3}$, determine its asymptotes.

A. Vertical asymptote is $x=\frac{1}{3}$, horizontal asymptote is $y=-\frac{1}{3}$.

B. Vertical asymptote is $x=3$, horizontal asymptote is $y=-3$.

C. Vertical asymptote is $x=-3$, horizontal asymptote is $y=-\frac{1}{3}$.

D. Vertical asymptote is $x=-3$, horizontal asymptote is $y=3$.

E. Vertical asymptote is $x=0$, horizontal asymptote is y=0.

13. Find the **Absolute Maximum** value of function $f(x)=\frac{x}{x^2+1}$ over the closed interval [0, 2] .

A. $-\frac{1}{2}$

B. 0

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

D. $\frac{2}{5}$

E. 1