2-4-20 1st Trig

① $f(x) = 3x^{-3} - 4x^{-5}$

$f'(x) = -9x^{-4} + 20x^{-6}$

$\frac{-9}{x^4} + \frac{20}{x^6}$

② $f(x) = \frac{2}{x^3} - \frac{3}{x^{10}}$

Rewrite as

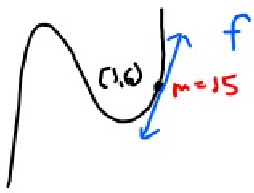
$f(x) = 2x^{-3} - 3x^{-10}$

$f'(x) = -6x^{-4} + 30x^{-11}$

$\frac{-6}{x^4} + \frac{30}{x^{11}}$

③ What is the slope of the tangent line at $(1,6)$ on $f(x) = x^3 + 6x^2 - 1$

$f'(x) = 3x^2 + 12x$

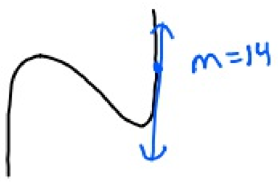


$f'(1) = 3 \cdot 1^2 + 12 \cdot 1$

$= 15$

slope is 15.

④ Give the equation of the line tangent to $f(x) = x^3 + 2x - 1$ at $(2,11)$.



$f'(x) = 3x^2 + 2$

$f'(2) = 3 \cdot 2^2 + 2$

$= 14$

$m = 14 \quad (2,11)$

$y - y_1 = m(x - x_1)$

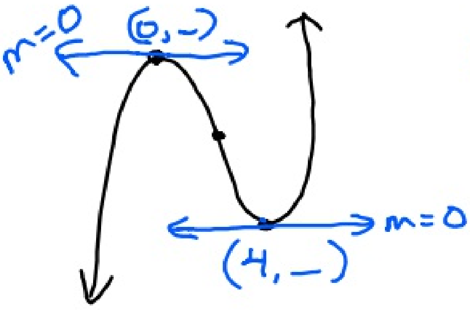
$y - 11 = 14(x - 2)$

$y - 11 = 14x - 28$

$+11 \quad +11$

$y = 14x - 17$

⑤ Give the critical points on $f(x) = x^3 - 6x^2 + 2$



$f'(x) = 3x^2 - 12x$

$3x^2 - 12x = 0$

$3x(x-4) = 0$

$3x = 0$ $\quad$ $x - 4 = 0$
$ \quad +4 +4$

$x = 0$ $\quad$ $x = 4$

Plug these x's back into original eq.

$f(x) = x^3 - 6x^2 + 2$

$f(0) = 0^3 - 6 \cdot 0^2 + 2 = 2$ $\quad$ $(0, 2)$

$f(4) = 4^3 - 6 \cdot 4^2 + 2 = -30$ $\quad$ $(4, -30)$

Point of Inflection

$f''(x) = 6x - 12$

$6x - 12 = 0$

$x = 2$

$f(2) = 2^3 - 6 \cdot 2^2 + 2 = -14$ $\quad$ $(2, -14)$

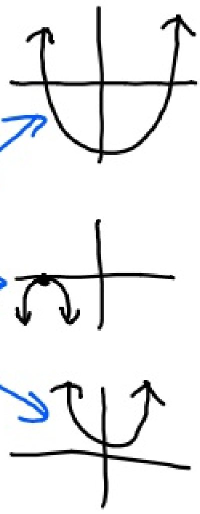
Match

Discriminant value is

Ⓐ -3

Ⓑ 0

Ⓒ 10



2-4-20 3rd Trig

① $f(x) = 3x^{-3} - 6x^{-2}$

$f'(x) = -9x^{-4} + 12x^{-3}$

$\dfrac{-9}{x^4} + \dfrac{12}{x^3}$

② $f(x) = \dfrac{12}{x^3} - \dfrac{2}{x^4}$

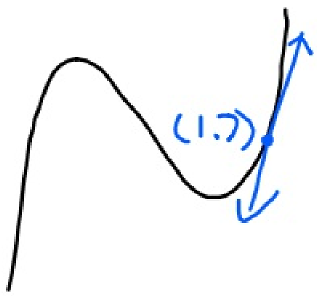
Rewrite as

$f(x) = 12x^{-3} - 2x^{-4}$

$f'(x) = -36x^{-4} + 8x^{-5}$

$\dfrac{-36}{x^4} + \dfrac{8}{x^5}$

③ What is the slope of the line tangent to $f(x) = x^3 + 6x^2 - 3$ at $(1,7)$?



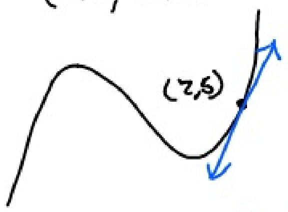
$f'(x) = 3x^2 + 12x$

$f'(1) = 3 \cdot 1^2 + 12 \cdot 1$

$= 15$

Slope is 15.

④ What is the equation of the line that is tangent to $f(x) = x^3 - 2x + 1$ at $(2, 5)$?



$f'(x) = 3x^2 - 2$

$f'(2) = 3 \cdot 2^2 - 2 = 10$

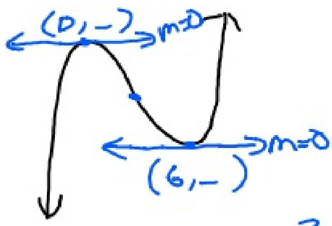
slope is 10.

$y - y_1 = m(x - x_1)$

$y - 5 = 10(x - 2)$

$$\begin{array}{l} y - 5 = 10x - 20 \\ \quad +5 \qquad\quad\;\; +5 \\ \hline y = 10x - 15 \end{array}$$

⑤ Give the critical points on $f(x) = x^3 - 9x^2$.



$f'(x) = 3x^2 - 18x$

$3x^2 - 18x = 0$

$3x(x - 6) = 0$

$3x = 0 \qquad x - 6 = 0$

$x = 0 \qquad x = 6$

Plug these x's into the ORIGINAL equation

$f(x) = x^3 - 9x^2$

$f(0) = 0^3 - 9 \cdot 0^2 = 0 \qquad (0,0)$

$f(6) = 6^3 - 9 \cdot 6^2 = -108 \qquad (6,-108)$

Point of Inflection

$f''(x) = 6x - 18$

$6x - 18 = 0$

$x = 3$

$f(x) = 3^3 - 9 \cdot 3^2 = -54 \qquad (3,-54)$

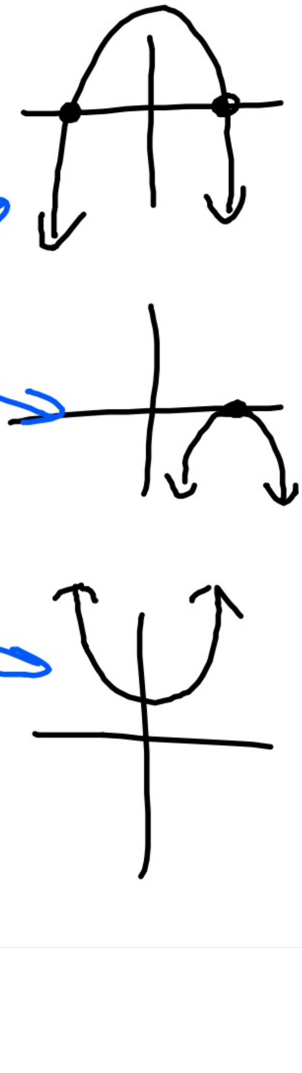
Match

Discriminant value is

A) 0

B) -4

C) 7



2-4-20 4th Trig

① $f(x) = 2x^{-4} - 5x^{-2}$

$f'(x) = -8x^{-5} + 10x^{-3}$

$\frac{-8}{x^5} + \frac{10}{x^3}$

② $f(x) = \frac{2}{x^4} - \frac{6}{x^3}$

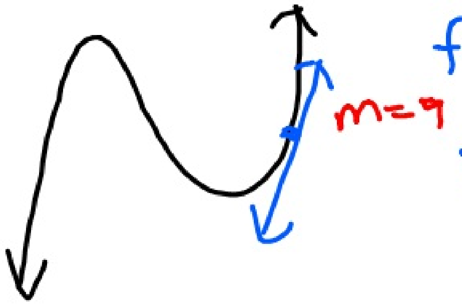
Rewrite

$f(x) = 2x^{-4} - 6x^{-3}$

$f'(x) = -8x^{-5} + 18x^{-4}$

$\frac{-8}{x^5} + \frac{18}{x^4}$

③ What is the slope of the line that is tangent to $f(x) = x^3 + 6x - 1$ at $(1, 6)$?



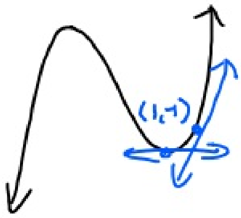
$f'(x) = 3x^2 + 6$

$f'(1) = 3 \cdot 1^2 + 6$

$= 9$

Slope is 9.

④ Give the equation of the line tangent to $f(x) = x^3 - 2x^2 + x - 1$ at $(1,-1)$.



$f'(x) = 3x^2 - 4x + 1$

$f'(1) = 3 \cdot 1^2 - 4 \cdot 1 + 1$

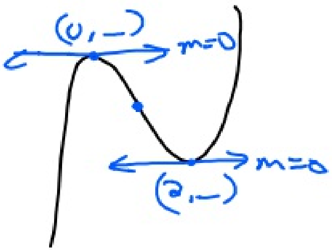
$= 0$

$y - y_1 = m(x - x_1)$

$y - {}^-1 = 0(x - 1)$

$$\begin{array}{r} y + 1 = 0 \\ -1 \quad -1 \\ \hline y = -1 \end{array}$$

⑤ Find the critical points on $f(x) = x^3 - 3x^2 + 2$.



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

$3x^2 - 6x = 0$

$3x(x-2) = 0$

$3x = 0$ $\quad$ $x - 2 = 0$

$x = 0$ $\quad$ $+2 \; +2$

$x = 2$

Plug these x's back into ORIGINAL Equation.

$f(x) = x^3 - 3x^2 + 2$

$f(0) = 0^3 - 3(0)^2 + 2 = 2 \quad (0,2)$

$f(2) = 2^3 - 3(2)^2 + 2 = -2 \quad (2,-2)$

Point of Inflection

$f''(x) = 6x - 6$

$6x - 6 = 0$

$x = 1$

$f(1) = 1^3 - 3(1)^2 + 2 = 0 \quad \boxed{(1,0)}$

Matching

Discriminant Values

(A) -4

(B) 7

(C) 0