1-23-18 1st Trig

Ch. 7 PT 1

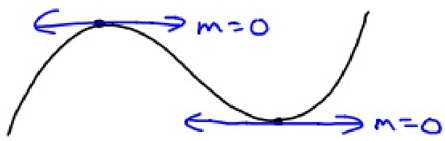
(4) $f(x) = \frac{5}{x^3} + \frac{3}{x^2} - \frac{1}{2}x^2$

Rewrite as $5x^{-3} + 3x^{-2} - \frac{1}{2}x^2$

$f'(x) = -15x^{-4} - 6x^{-3} - x$

$\frac{-15}{x^4} - \frac{6}{x^3} - x$

(9) $f(x) = x^3 + 3x^2 - 45x$




$f'(x) = 3x^2 + 6x - 45$

$3x^2 + 6x - 45 = 0$

$3(x^2 + 2x - 15) = 0$

$3(x+5)(x-3) = 0$

$x + 5 = 0$ $\quad$ $x - 3 = 0$

$x = -5$ $\quad$ $x = 3$

$f(-5) = (-5)^3 + 3(-5)^2 - 45(-5)$

$= 175$ $\quad$ $(-5, 175)$

$f(3) = 3^3 + 3(3)^2 - 45(3)$

$= -81$

$(3, -81)$

Point of Inflection

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

$6x + 6 = 0$

$x = -1$

$f(-1) = (-1)^3 + 3(-1)^2 - 45(-1)$

$47$

$(-1, 47)$

(14) $b^2-4ac$

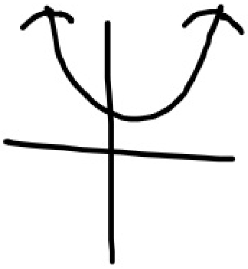
$$f(x)=\underset{a}{\underline{3}}x^2\underset{b}{\underline{-4}}x\underset{c}{\underline{-1}}$$

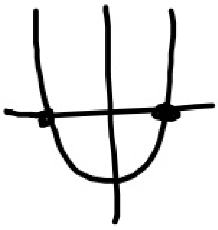
$$(-4)^2-4\cdot 3\cdot -1$$

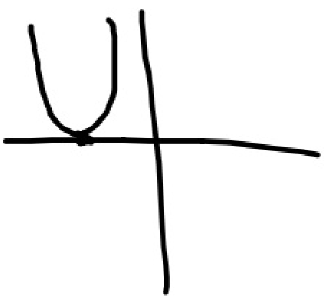
$$16+12$$

$$28$$

$\therefore$ 2 solutions

(16)  None

(17)  2 solutions

(18)  1 solution

# New practice

① $f(x) = \dfrac{3}{x^3} + \dfrac{2}{x}$

$f(x) = 3x^{-3} + 2x^{-1}$

$f'(x) = -9x^{-4} - 2x^{-2}$

$= \dfrac{-9}{x^4} - \dfrac{2}{x^2}$

② $f(x) = x^3 + 9x^2 + 10$

Critical Points

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

$3x^2 + 18x = 0$

$3x(x+6) = 0$

$x = 0 \qquad x + 6 = 0$

$x = -6$

$f(0) = 0^3 + 9(0)^2 + 10 = 10$

$(0, 10)$

$f(-6) = (-6)^3 + 9(-6)^2 + 10 = 118$

$(-6, 118)$

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

$6x + 18 = 0$

$x = -3$

$f(-3) = (-3)^3 + 9(-3)^2 + 10 = 64$

$(-3, 64)$

③ What is the point of inflection for

$$f(x) = \frac{1}{3}x^3 + 4x^2 + 12x + 8$$

$$f'(x) = x^2 + 8x + 12$$

$$f''(x) = 2x + 8$$

$$2x + 8 = 0$$

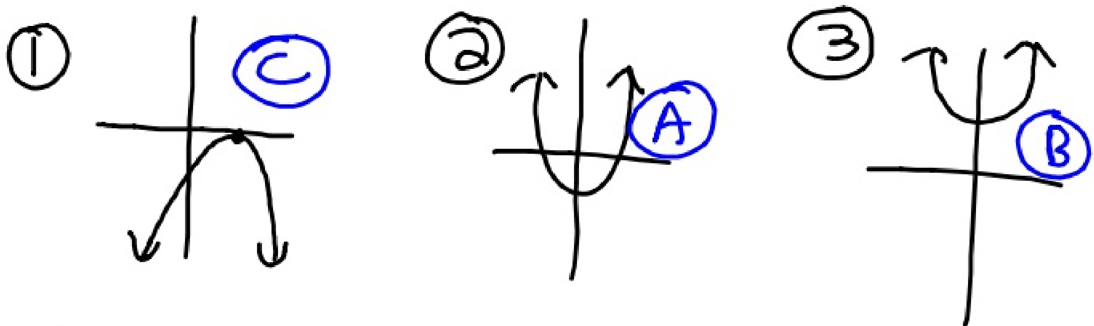
$$x = -4$$

$$f(-4) = \frac{1}{3}(-4)^3 + 4(-4)^2 + 12(-4) + 8$$

$$= 2\tfrac{2}{3}$$

$$\left(-4, 2\tfrac{2}{3}\right)$$

Match




Discriment value

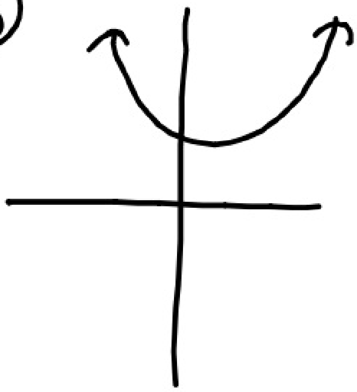
Ⓐ 18 Ⓑ -4 Ⓒ 0

1-23-18 3rd Trig

Ch 7 PT 1

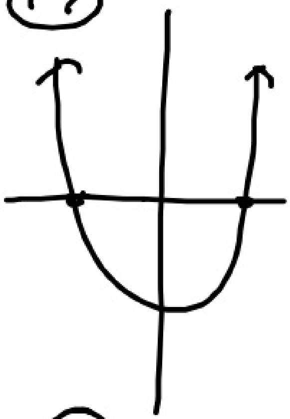
16-18

(16)



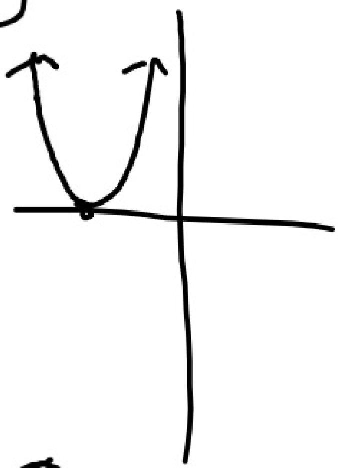
(C) -35

(17)



(A) 40

(18)



(B) 0

(14) $f(x) = \underset{a}{\underline{3}}x^2 \underset{b}{\underline{-4}}x - \underset{c}{\underline{1}}$

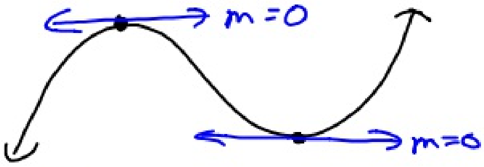
$b^2 - 4ac$

$(-4)^2 - 4 \cdot 3 \cdot -1$

$16 + 12$

$28$ 2 solutions

⑨ $f(x) = x^3 + 3x^2 - 45x$




$f'(x) = 3x^2 + 6x - 45$

$3x^2 + 6x - 45 = 0$

$3(x^2 + 2x - 15) = 0$

$3(x+5)(x-3) = 0$

$x+5=0 \qquad x-3=0$

$x=-5 \qquad x=3$

Plug $x=-5$ & $x=3$ into original eq.

$f(x) = x^3 + 3x^2 - 45x$

$f(-5) = (-5)^3 + 3(-5)^2 - 45(-5) = 175$

$(-5, 175)$

$f(3) = 3^3 + 3(3)^2 - 45(3) = -81$

$(3, -81)$

Point of Inflection

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

$6x+6=0$

$x=-1$

$f(-1) = (-1)^3 + 3(-1)^2 - 45(-1) = 47$

$(-1, 47)$

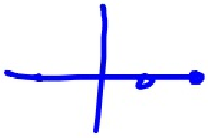
# New Practice

Find x and y intercept for

$$f(x) = x^2 + 6x + 5$$

x-intercept

$y = 0$



$$0 = x^2 + 6x + 5$$

$$0 = (x+1)(x+5)$$

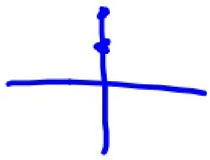
$x + 1 = 0$ $\qquad$ $x + 5 = 0$

$x = -1$ $\qquad$ $x = -5$

$(-1, 0)$ $\qquad$ $(-5, 0)$

y-intercept

$x = 0$



$$y = 0^2 + 6 \cdot 0 + 5$$

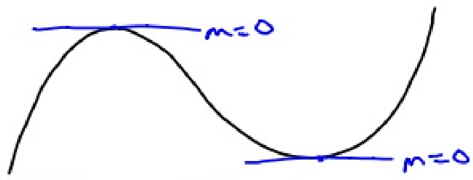
$$y = 5$$

$$(0, 5)$$

1-23-18 4th Trig

Ch. 7 PT 1

(11) $f(x) = 3x^3 - 18x^2 - 4$




$f'(x) = 9x^2 - 36x$

$9x^2 - 36x = 0$

$9x(x-4) = 0$

$9x = 0 \qquad x - 4 = 0$

$x = 0 \qquad x = 4$

$f(x) = 3x^3 - 18x^2 - 4$

$x=0 \quad f(0) = 3\cdot 0^3 - 18\cdot 0^2 - 4 = -4$

$(0,-4)$ ← relative maximum

$x=4 \quad f(4) = 3\cdot 4^3 - 18\cdot 4^2 - 4 = -100$

$(4,-100)$ ← rel. minimum

Point of Inflection

$f''(x) = 18x - 36$

$18x - 36 = 0$

$x = 2$

$f(2) = 3\cdot 2^3 - 18\cdot 2^2 - 4 = -52$

$(2,-52)$

(14) $f(x) = \underset{a}{\underline{3}}x^2 \underset{b}{\underline{-4}}x \underset{c}{\underline{-1}}$

$b^2 - 4ac$

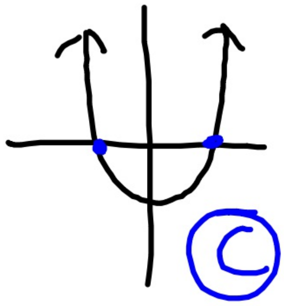
$(-4)^2 - 4\cdot 3\cdot -1$

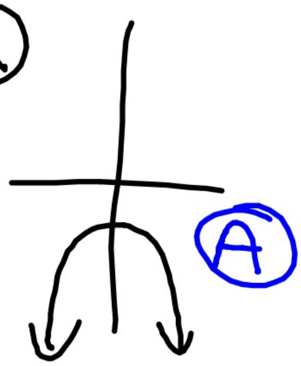
$16 + 12$

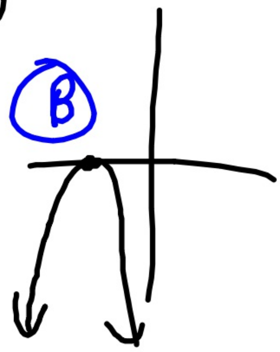
$28$

2 solutions

# New Practice

1



2



3



Discriminant value of

A -3

B 0

C 7

② What is the point of inflection on

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

$$f'(x) = 12x^2 - 6x$$

$$f''(x) = 24x - 6$$

$$24x - 6 = 0$$

$$x = \frac{1}{4}$$

$$f\left(\frac{1}{4}\right) = 4 \cdot \frac{1}{4}^3 - 3 \cdot \frac{1}{4}^2 + 4 = \frac{31}{8}$$

$\left(\frac{1}{4}, \frac{31}{8}\right)$ or $(.25, 3.875)$

$\left(\frac{1}{4}, 3\tfrac{7}{8}\right)$