

反射テスト 解析 3次関数のグラフ 01

1. 次の関数を xy 座標平面上に図示せよ. その際, x 切片, y 切片, 極値の x 座標を記せ.

(S 級 2 分 10 秒, A 級 3 分 20 秒, B 級 5 分, C 級 8 分)

(1) $y = x^3$

(2) $y = x^3 - x$

(3) $y = x^3 - x^2$

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

2. 次の関数を xy 座標平面上に図示せよ. その際, x 切片, y 切片, 極値の x 座標を記せ.

(S 級 3 分 30 秒, A 級 5 分, B 級 7 分, C 級 10 分)

(1) $y = -x^3 + 3x^2 - 3x + 1$

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

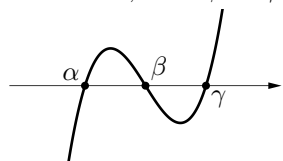
(3) $y = -x^3 - 6x^2 - 9x$

(4) $y = x^3 - x^2 - 9x + 9$

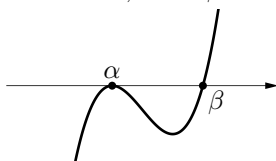
反射テスト 解析 3次関数のグラフ 01 解答解説

★ 3 次関数のグラフ

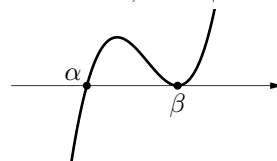
(ア) $y = (x - \alpha)(x - \beta)(x - \gamma)$
ただし, $\alpha < \beta < \gamma$



(イ) $y = (x - \alpha)^2(x - \beta)$
ただし, $\alpha < \beta$



(ウ) $y = (x - \alpha)(x - \beta)^2$
ただし, $\alpha < \beta$



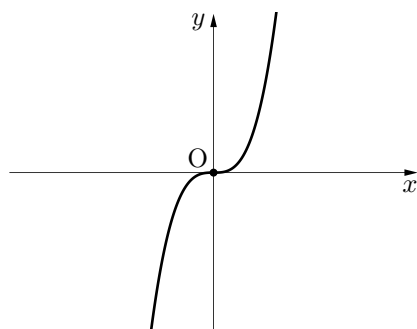
1. 次の関数を xy 座標平面上に図示せよ. その際, x 切片, y 切片, 極値の x 座標を記せ.

(S 級 2 分 10 秒, A 級 3 分 20 秒, B 級 5 分, C 級 8 分)

(1) $y = x^3$

$$\frac{dy}{dx} = 3x^2$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = 0$$

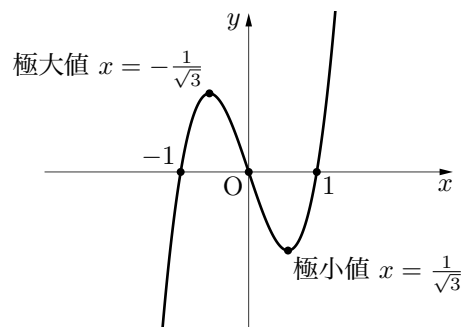


(2) $y = x^3 - x$

$$y = x(x^2 - 1) = (x + 1)x(x - 1)$$

$$\frac{dy}{dx} = 3x^2 - 1 = 3\left(x + \frac{1}{\sqrt{3}}\right)\left(x - \frac{1}{\sqrt{3}}\right)$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = \pm \frac{1}{\sqrt{3}}$$

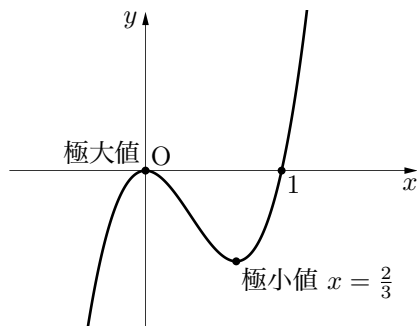


(3) $y = x^3 - x^2$

$$y = x^2(x - 1)$$

$$\frac{dy}{dx} = 3x^2 - 2x = x(3x - 2)$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = 0, \frac{2}{3}$$

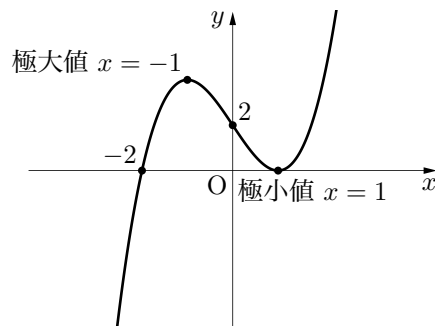


(4) $y = x^3 - 3x + 2$

$$y = (x + 2)(x - 1)^2$$

$$\frac{dy}{dx} = 3x^2 - 3 = 3(x + 1)(x - 1)$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = \pm 1$$



2. 次の関数を xy 座標平面上に図示せよ. その際, x 切片, y 切片, 極値の x 座標を記せ.

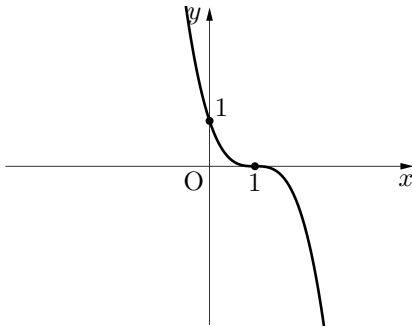
(S 級 3 分 30 秒, A 級 5 分, B 級 7 分, C 級 10 分)

(1) $y = -x^3 + 3x^2 - 3x + 1$

$$y = -(x^3 - 3x^2 + 3x - 1) = -(x-1)^3$$

$$\frac{dy}{dx} = -3(x-1)^2$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = 1$$

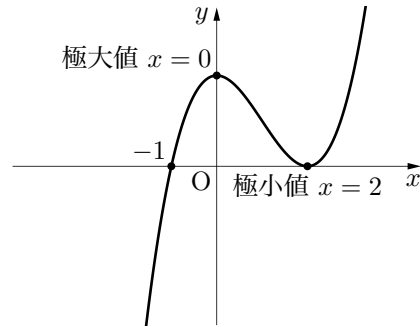


(2) $y = x^3 - 3x^2 + 4$

$$y = (x+1)(x-2)^2$$

$$\frac{dy}{dx} = 3x^2 - 6x = 3x(x-2)$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = 0, 2$$

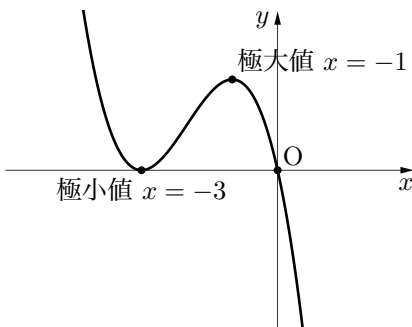


(3) $y = -x^3 - 6x^2 - 9x$

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

$$\frac{dy}{dx} = -3x^2 - 12x - 9 = -3(x+3)(x+1)$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = -3, -1$$



(4) $y = x^3 - x^2 - 9x + 9$

$$y = (x-1)(x^2 - 9) = (x+3)(x-1)(x-3)$$

$$\frac{dy}{dx} = 3x^2 - 2x^2 - 9$$

$$\frac{dy}{dx} = 0 \Leftrightarrow x = \frac{1 \pm 2\sqrt{7}}{3}$$

