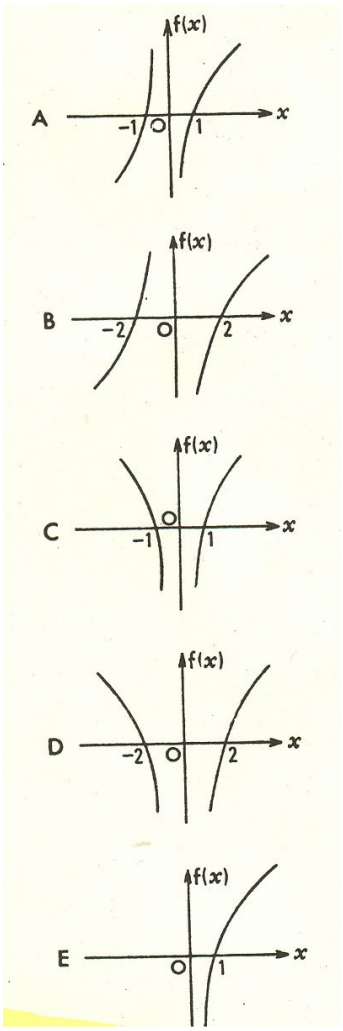
1. Which of the following is most likely to show the graph of the function $f: x \to \log(x^2), x \neq 0$?



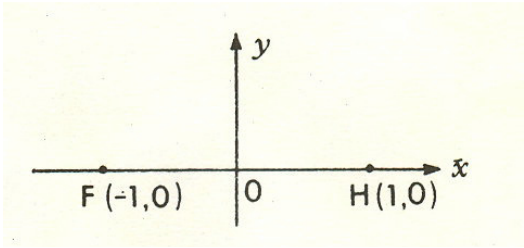
2. If O, P and Q are distinct points such that $\overrightarrow{OQ} = -3\overrightarrow{OP}$, which of the following is/are true?

(1) $|\overrightarrow{OQ}| > |\overrightarrow{OP}|$

(2) O, P, Q, are collinear

(3) O lies between P and Q

A (1), (2) and (3)
B (1) only
C (2) only
D (3) only
E some other combination of (1), (2) and (3)

3. 

F is the point (-1, 0) and H is the point (1, 0).

P is any point on the line segment FH such that $\overrightarrow{OP} = k\overrightarrow{FH}$.

The set of possible values of k is

A $\{k: 0 \leq k \leq \frac{1}{2}\}$
B $\{k: 0 \leq k \leq \frac{1}{2}\}$
C $\{k: \frac{1}{2} \leq k \leq \frac{1}{2}\}$
D $\{k: -\frac{1}{2} \leq k \leq 1\}$
E $\{k: -1 \leq k \leq 1\}$

4. P is the point (1, 2, 3), $\overrightarrow{PR}$ represents the vector $\begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ and $\overrightarrow{RQ}$ represents the vector $\begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix}$

Q is the point
A (2, 3, 4)
B (4, 3, 5)
C (5, 4, 6)
D (-1, 2, 2)
E (-3, 0, 0)

5. For which of the following values of a is $\int_a^{2a} \cos x \, dx = 0$?

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$ (3) π

A (1) only
B (2) only
C (3) only
D (1) and (2) only
E (2) and (3) only

6. Given that $\boldsymbol{u}$ and $\boldsymbol{v}$ are vectors such that $\boldsymbol{u} = \begin{pmatrix} -2 \\ 6 \\ 4 \end{pmatrix}$ and $\boldsymbol{v} = \begin{pmatrix} 6 \\ -4 \\ 2 \end{pmatrix}$, then the angle between them is

A 0

B $\frac{\pi}{6}$

C $\frac{\pi}{4}$

D $\frac{\pi}{2}$

E $\frac{2\pi}{3}$

7. Given that $\log_{10} y \frac{1}{2} \log_{10} y = \frac{1}{2} \log_{10} 5$, $x, y > 0$, then y is equal to

A $\frac{x}{10}$

B $\frac{1}{2}x - 5$

C $\sqrt{x} - 5$

D $\frac{\sqrt{x}}{5}$

E $\frac{\sqrt{x}}{5}$

8. The tangent to the circle $x^2 + y^2 = 25$ at the point $(3, -4)$ has equation

A $3x + 4y = 5$
B $3x - 4y = 5$
C $3x + 4y = 25$
D $3x - 4y = 25$
E $3x - 4y = 0$

9. Given that $f(x) = \sin^3 x$, then $f'(x)$ equals

A $\cos^3 x$
B $3 \sin^2 x$
C $3 \cos^2 x$
D $3 \sin^2 x \cos x$
E $3 \sin x \cos^2 x$

10. For which of the following definitions of * on the set of positive real numbers is $p*q$ **not** equal to $q*p$?

$p*q$ equals

A $p + q$

B $p^2 + q^2$

C $\frac{pq}{p+q}$

D $pq(p + q)$

E $pq + q^2$