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Wolaita Sodo University

College of Natural & Comp. Science

Department of Mathematics

Basic Mathematics Final Examination For 1st year Natural Science

Time allowed: $2\frac{1}{2}$hrs.

Max.Load: 50% **Date: 28/04/12 E.C**

Name: _____ **Sectio** _____

Part I(1.5pt) For each of the following statement write TRUE if the statement is correct and FALSE if the statement is incorrect in the shaded region only.

TRUE 1.The range of an odd degree polynomial function is the set of all real numbers.

FALSE 2. Vertical line is linear function.

TRUE 3. The amplitude of the function f(x)=sin(2x) is one.

TRUE 4. The function $f(x) = \pi^{0.5x}$ is an exponential growth function.

FALSE 5. Hyperbolic function is periodic

FALSE 6. The domain of the function f(x)=cschx is $\mathbb{R} \setminus \{1\}$.

FALSE 7. The graph of a function is a curve in the xy-plane.

FALSE 8. The range of f(x)=secx is $\mathbb{R} \setminus (-1,1)$.

TRUE 9. The locus of the equation $x^2 + y^2 - 2x + 4y + 5 = 0$ is a point circle.

FALSE 10. The function $f: \mathbb{R} \setminus \{1\} \longrightarrow \mathbb{R}$,defined by $f(x) = \frac{2x-1}{x-1}$ has no an inverse.

Part II:(1.5pt)For the following question, choose the correct answer from the given options & write the letter of your choice in the shaded region only.

C 1) Which one of the following is the slope of a line whose equation is 2(y-x-4)=3(1-3x)+y is:

A) -11 B) -8 C). -7 D) -5 E) none of the above

E 2) Let $f(x) = (x^4 - 2x^2 - 8)(x^3 - 2x^2 - x + 2)$. Then the sum of multiplicities of roots 1 & 2 is; A) 7 B) 5 C) 3 D) 2 E) 4

3) If the y-intercept and the x-intercept are 2 & -3 respectively, then which one is the equation of the line ?

A) $3x-2y-6=0$ B) $3x-2y+6=0$ C) $3y-2x-6=0$

D) $3y-2x+6=0$ E) none of the above

4) Which of the following is false about the function $f(x) = 2^x-1$?

A) The domain is $\mathbb{R}$. B) The line $y=0$ is the horizontal asymptote.

C) It is an increasing function D) The range is $(-1,\infty)$ E) none of the above

5) The distance b/n the line whose equation $3y-4x+13=0$ and the point $(-1,1)$ is ;

A) $\frac{6}{5}$ B) 2 C) 4 D) 5 E) none of the above

6) Let $R=\{(x,y): y \geq x-3\}$ be a relation. Then which one is false about R^{-1} ?

A) $R^{-1}=\{(y,x): y \geq x-3\}$ B) $R^{-1}=\{(y,x): x \geq y+3\}$

C) $R^{-1}=\{(x,y): y \leq x+3\}$ D) $R^{-1}=\{(x,y): x \geq y-3\}$ E) B & D

7) If the equation $x^2+y^2+6y-2(x+3)+2k=0$ represent a real circle, then which one of the following cannot be possible value of k?

A) 4 B) 5 C) 7 D) 8 E) -5

8) Which of the following is false about the function $f(x) = \log_{(0.1)} x$?

A) It is a decreasing function B) It approaches the negative y-axis.

C) Its inverse is $f^{-1}(x)= =10^{-x}$ D) Its x-intercept is at (1,0). E) none of the abov

9. Which of the following is a polynomial function?

A) $f(x)=x^3+2x^2-3\sqrt{x}+2$ B) $f(x)=3x^7+4|x|$ C) $f(x)=\sqrt[3]{5}$

D) $f(x)=3x^4-2x^3+6x^{-2}+7x-2$ E) B & D

10. Which one is false about a rational function? $f(x)=\frac{x-3}{x^2+4x-12}$

A) Domain of $f(x)$ is $\mathbb{R}/\{2,-6\}$ B) The horizontal asymptote is $y=0$

B) The x-intercept is (3,0). D) The y-intercept is $\left(\frac{1}{4},0\right)$ E) none of the above

SPARK 2
LIGHT UP

III: (1.5pts) Short Answers:

Write the most simplified answers in the given space only.

Suppose ℓ_1 and ℓ_2 are perpendicular lines intersecting at (–1, 2). If the angle of inclination of ℓ_1 is 45°, then the equation of ℓ_2 is $y = x + 3$

Suppose the endpoints of a line segment AB are A(–5,1) and B(5, 10). Then the coordinates of point P if P divides segment AB in the ratio 2:3 is $-1, 23/5$

$p(x) = x^5 - 2x^2 - 3$ is divided by $x + 1$ the quotient is $x^4 x^3 - x^2 = x$

$f(x) = e^{3x-1}$. Then $f^{-1}(x) =$ $\ln x + 1/2$

general equation of a circle tangent to a line whose equation 2x-y-5 and centered at point (-1.3) is: $x = x + 5$

slope-intercept equation of a line which passes through $(-1, \sqrt{3})$ and whose ation angle is 105° is; $y - 5 = 1 \quad (1 \; \sqrt{3})$

neral value of x for $\cos x + \sin x = 1$ $n\pi$ or π/n wher n is 0, 1, 2, 3 ---

olitude and period of $f(x) = -7 \sin\left(\frac{\pi}{4}x - \frac{\pi}{4}\right)$ are -7 & $\frac{-\pi}{4}$ respectively.

rkout(8pts): (Each contains 2, 3, 3pts respectively.)

necessarily steps Clearly in the attached paper.

he zero of a polynomial function $f(x) = 2x^3 - 5x^2 + 14x + 39$, then find

$(3 - x)$. Sketch the graph of the function f and identify the domain, rang ymptotes of f.

SPARK2
LIGHT UP

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Department of Mathematics

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Part II:(1.5pt)For the following question, choose the correct answer from the given options & write the letter of your choice in the shaded region only.

C 1) Which one of the following is the slope of a line whose equation is 2(y-x-4)=3(1-3x)+y is:

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A 7) If the equation $x^2+y^2+6y-2(x+3)+2k=0$ represent a real circle, then which one of the following cannot be possible value of k?

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B 9) Which of the following is a polynomial function?

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Part III: (1.5pts) Short Answers:

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1) Suppose ℓ_1 and ℓ_2 are perpendicular lines intersecting at (−1, 2). If the angle of inclination of ℓ_1 is 45°, then the equation of ℓ_2 is $y = -x + 1$

2) Suppose the endpoints of a line segment AB are A(−5,1) and B(5, 10). Then the coordinates of point P if P divides segment AB in the ratio 2:3 is $P(-1, 23/5)$

3) If $p(x) = x^5 - 2x^2 - 3$ is divided by $x + 1$ the quotient is $x^4 - x^3 + x^2 - 3x + 3$

4) Let $f(x) = e^{3x-1}$. Then $f^{-1}(x) = \frac{\ln x}{3} + \frac{1}{3}$

5) The general equation of a circle tangent to a line whose equation 2x-y-5 and centered at the point (-1,3) is: $(x+1)^2 + (y-3)^2 = 10$

6) The slope-intercept equation of a line which passes through $(-1, \sqrt{3})$ and whose inclination angle is 105° is: $y = -3.7x + \sqrt{3} - 3.7$

$m = \tan(105°) = -3.7$ (m) (b)

7) The general value of x for $\cos x + \sin x = 1$ is 0

8) The amplitude and period of $f(x) = -7\sin\left(\frac{\pi}{4}x - \frac{\pi}{4}\right)$ are $|-7|$ & $\frac{8\pi}{\pi} = 8$ respectively.

$= 7$

Part IV: Workout(8pts): (Each contains 2, 3, 3pts respectively.)

Write all the necessarily steps Clearly in the attached paper.

1) If $2 + 3i$ is the zero of a polynomial function $f(x) = 2x^3 - 5x^2 + 14x + 39$, then find all zeros of f.

2) Let $f(x) = \log_2(3 - x)$. Sketch the graph of the function f and identify the domain, range, intercepts and asymptotes of f.

3) Given $f(x) = \frac{2|x|}{x-3}$, find the domain, range, intercepts and asymptotes of f and sketch graph.