King Fahd University of Petroleum and Minerals
College of Sciences,
Prep-Year Math Program

Code 001

Math 001, Final Exam
Term (021)
January 18, 2003
Time Allowed: 2 1/2 Hours

Code 001

STUDENT NAME:_____

ID #:_____ SECTION # :_____

Important Instructions:

1. **All types of calculators, pagers or telephone are NOT allowed during the examination.**
2. **Use HB 2.5 pencils only**
3. **Use a good eraser. Do NOT use the erasers attached to the pencil.**
4. **Write your name, ID number and Math section number on both the examination paper and the OMR sheet.**
5. **Detach the OMR sheet carefully.**
6. **When bubbling your ID number and Math section number, be sure that the bubbles match with the number that you write.**
7. **Match the Test Code Number already bubbled in your answer sheet with the Test Code Number printed on your question paper.**
8. **When erasing a bubble, make sure that you do not leave any trace of penciling.**
9. **Check that the exam paper has 30 questions.**

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1) If $(x+1)$ is a factor of the polynomial $P(x)=x^3+kx^2+2kx-2$, then k is equal to:

a) 6

b) $\frac{1}{3}$

● -3

d) 3

e) $\frac{-2}{3}$

2) If $g(x)=\frac{3x-1}{2x+1}$, then $g^{-1}(x)$ is equal to:

a) $\frac{2x+1}{3x-1}$

● $\frac{x+1}{3-2x}$

c) $\frac{2x-1}{3x-1}$

d) $\frac{3-x}{2+x}$

e) $\frac{3+2x}{x-1}$

3) The expression $\frac{3}{4(x^2+x-2)}+\frac{1}{4(x^2+5x+6)}$ simplifies to:

a) $\frac{4}{(x-1)(x+2)}$

b) $\frac{-2}{(x-1)(x+3)}$

c) $\frac{3}{(x+2)(x+3)}$

● $\frac{1}{(x-1)(x+3)}$

e) $\frac{6}{(x-1)(x+3)}$

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4) The far-left and far-right behavior of the graph of the polynomial $P(x) = -5x^7 - 3x^4 + 2x - 1$ is as follows:

a) Down to the left and down to the right

b) Down to the left an up to the right

c) Up to the left and up to the right

● Up to the left and down to the right

e) None of the above.

5) A polynomial of lowest degree and real coefficients having $1+i$ and i as zeros is:

● $x^4 - 2x^3 + 3x^2 - 2x + 2$

b) $x^4 + 2x^3 - 3x^2 + 2x - 2$

c) $x^4 - 2x^3 - 3x^2 - 2x - 2$

d) $x^4 + 2x^3 + 3x^2 + 2x + 2$

e) $x^4 - 2x^3 - 3x^2 + 2x + 2$

6) If $i = \sqrt{-1}$, then $\dfrac{(1+i)^2}{1-i}$ is equal to:

a) $-2i$

b) $1+i$

c) $1-i$

d) $-1-i$

● $-1+i$

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7) The real zeros of the polynomial $P(x)=(x^2-x)^3(x^2+4x+4)^2$ are:

a) 1 (multiplicity 3), and –2 (multiplicity 4)

b) 1 (multiplicity 3), and –2 (multiplicity 2)

● 0 (multiplicity 3), 1 (multiplicity 3), and –2 (multiplicity 4)

d) 0 (multiplicity 1), 1 (multiplicity 3), and –2 (multiplicity2)

e) 0 (multiplicity 3), and 1 (multiplicity 3)

8) The sum of all solutions of the equation $(y+3)^{2/3}-2(y+3)^{1/3}-3=0$ is:

a) -27

● 20

c) 28

d) 30

e) –18

9) The solution set of the inequality $\left|x-\frac{1}{2}\right|-\frac{3}{2}>0$ is:

● $(-\infty,-1)\cup(2,\infty)$

b) $(-1,2)$

c) $(-\infty,\frac{1}{2})\cup(\frac{3}{2},\infty)$

d) $(-\infty,-\frac{3}{2})\cup(2,\infty)$

e) $(-2,2)$

10) The largest negative integer that is a lower bound for the real zeros of the polynomial $P(x)=3x^3-x^2-2x+10$ is:

a) -3

b) -4

c) -5

● -2

e) -1

11) The domain of the inverse function of $f(x)=3x^2-12x$, for $x\geq 2$ is equal to:

a) $(-\infty,4]$

b) $[4,\infty)$

c) $(-\infty,-12]$

● $[-12,\infty)$

e) $[2,\infty)$

12) One of the factors of $81x^4-72x^2y^2+16y^4$ is:

a) $9x^2+4y^2$

● $3x+2y$

c) $3x^2+4y^2$

d) $27x+8y$

e) $9x+4y$

13) The number of ***noninteger rational zeros*** of the polynomial $P(x)=6x^5+2x^4+9x^3+3x^2+3x+1$ is:

a) 0

b) 2

● 1

d) 3

e) 4

14) Which one of the following functions has the graph given below?

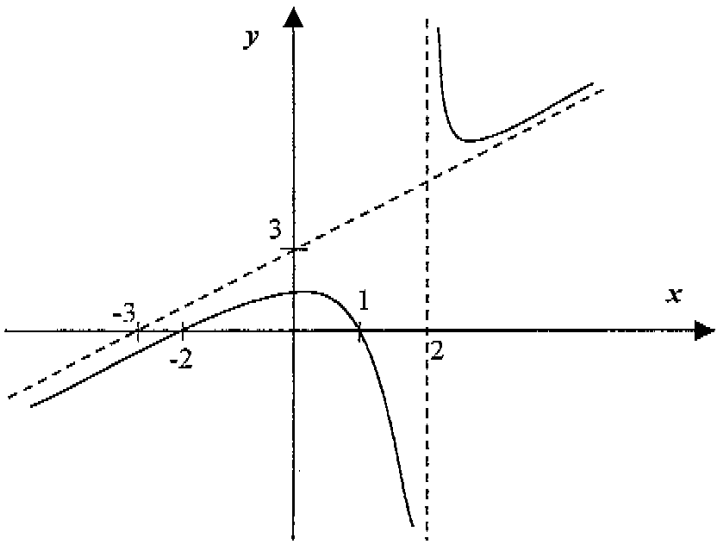
● $f(x)=\dfrac{x^2+x-2}{x-2}$

b) $f(x)=\dfrac{x^2+x-2}{(x-2)^2}$

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

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

e) $f(x)=\dfrac{x^2+2x}{x-2}$



15) The radius of the circle $2x^2+2y^2+8x-4y+8=0$ is equal to:

a) 5

b) 2

c) 3

d) 4

● 1

16) If (a,b) is the vertex of the parabola $y=-2x^2+4x-4$, then $a+b$ is equal to:

a) 2

b) −1

c) −2

d) 0

e) 1

17) If the graph of $y=\dfrac{x-1}{x+3}$ is shifted horizontally two units to left and vertically three units up, then the equation of the new graph is:

a) $y=\dfrac{4x+16}{x+5}$

b) $y=\dfrac{-2x-13}{x+5}$

c) $y=\dfrac{2x+14}{x+5}$

d) $y=\dfrac{-2x-17}{x+5}$

e) $y=\dfrac{4x+18}{x+5}$

18) The graph of the equation $3x^2=|2x-5y|$ is symmetric with respect to:

a) The y-axis only

b) The x-axis only

c) The origin only

d) The y-axis and the origin

e) The x-axis, the y-axis, and the origin

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19) The expression $\left[\left(\frac{x^{-3}}{y^2}\right)^2\left(\frac{y^{-6}}{xy^3}\right)^{-1}\right]^{-\frac{1}{5}}$ simplifies to:

a) $\frac{1}{xy}$

b) $\frac{y^2}{x}$

c) $\frac{x}{y^2}$

d) xy

● $\frac{x}{y}$

20) If the perimeter of a rectangle is 30 centimeters and its area is 36 square centimeters, then the length of the rectangle in centimeters is equal to:

a) 4

b) 6

● 12

d) 9

e) 15

21) The ***x*-intercept** of the line through the points $(2,-1)$ and $(-1,2)$ is

● $(1,0)$

b) $(-2,0)$

c) $(4,0)$

d) $(-3,0)$

e) $(3,0)$

22) Which one of the following polynomials has the graph given below?

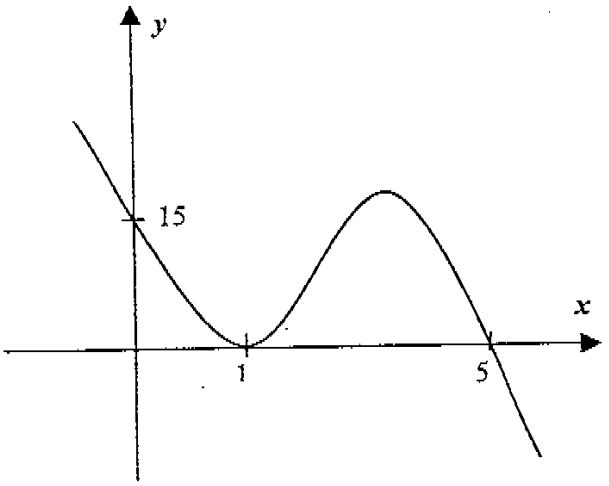
a) $P(x)=3(x-1)(x-5)^2$

b) $P(x)=3(x-1)^2(x-5)$

● $P(x)=-3(x-1)^2(x-5)$

d) $P(x)=3(x+1)^2(x+5)$

e) $P(x)=-3(x+1)(x-5)$



23) If the graph of $y=\dfrac{3x^2+3x+2}{kx^2+6x+k}$ has the line $x=1$ as a vertical asymptote, then it has a horizontal asymptote given by

a) $y=2$

b) $y=1$

c) $y=3$

d) $y=-3$

● $y=-1$

24) The expression $4\sqrt[3]{72}-\dfrac{10}{\sqrt[3]{81}}$ simplifies to:

a) $\dfrac{14}{9}\sqrt[3]{9}$

● $\dfrac{62}{9}\sqrt[3]{9}$

c) $-\dfrac{13}{9}\sqrt[3]{9}$

d) $\dfrac{-2}{9}\sqrt[3]{9}$

e) $\dfrac{53}{9}\sqrt[3]{9}$

25) If $f(x)=-\frac{1}{x}$, then $\frac{1}{h}\left[f\left(\frac{1}{2}+h\right)-f\left(\frac{1}{2}\right)\right]$ is equal to:

a) $\frac{4}{2+h}$

b) $\frac{-2}{1+2h}$

c) $\frac{1}{h^2}$

d) $\frac{2+h}{h(1+2h)}$

● $\frac{4}{1+2h}$

26) The solution set of the inequality $\frac{4}{x}<x$ is equal to:

a) $(-\infty,-2)\cup(0,\infty)$

b) $(-\infty,-2)\cup(0,2)$

c) $(-2,0)\cup(0,2)$

d) $(-\infty,0)\cup(2,\infty)$

● $(-2,0)\cup(2,\infty)$

27) The graph of the equation $|x-y|=1$ is:

a) Only two points

b) Two perpendicular lines

c) Only one point

● Two parallel lines

e) A circle

28) If $f(x)=\frac{1}{x^2-1}$ and $g(x)=\sqrt{x-1}$, then the value of $(f\circ g)(\frac{11}{2})$ is equal to :

a) $\frac{8}{7}$

b) $\frac{6}{7}$

● $\frac{2}{7}$

d) $\frac{\sqrt{2}}{119}$

e) $\frac{5\sqrt{2}}{7}$

29) If $f(x) = -x^2 - 4$, $x > 0$, then the graph of the *inverse function* $f^{-1}(x)$ lies completely in:

a) Quadrant II

b) Quadrant I

c) Quadrant III

d) Quadrants I an II

e) Quadrants II and III

30) Which one of the following functions has the graph given below?

a) $f(x) = \dfrac{-x^2}{x^2 - 1}$

b) $f(x) = \dfrac{x^2}{x^2 - 1}$

c) $f(x) = \left(\dfrac{x^2}{x^2 - 1}\right)^2$

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

e) $f(x) = \left(\dfrac{x^2 + 1}{x^2 - 1}\right)^2$