

King Fahd University of Petroleum and Minerals
Math Prep-Year Program
Math 001-Term 071

Q1. If $f(x) = \sqrt{x+4}$ and $g(x) = \sqrt{9-x^2}$, then the DOMAIN of $\left(\frac{f}{g}\right)(x)$ is equal to:

- a. $[-4, \infty)$ b. $[-4, 3)$ c. $[3, \infty)$ d. $[-3, 3]$ e. $(-3, 3)$

Q2. 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. $\frac{4}{1+2h}$ e. h

Q3. If $f(x) = 3x^2 - 1$ then $\frac{f(x+h) - f(x)}{h}$ is equal to:

- a. $6x$ b. $6x+3h$ c. $6x+3h^2$ d. 6 e. h

Q4. If $f(x) = \sqrt[3]{1-x^3}$, then $(f \circ f)(a) + 5$ is equal to:

- a. -3 b. $(a+5)^3$ c. a d. $a+5$ e. $a^3 + 5$

Q5. If $f(2) = 1$, find a point on $g(x) = 2f(3x) - 1$ **ANS: $(2/3, 1)$**

Q6. The RADIUS of the circle $4x^2 + 4y^2 - 16x + 8y + 19 = 0$ is equal to: **ANS: $1/2$**

Q7. Find the equation of the circle in quadrant 3, and is tangent to both axis and has radius = 4.

ANS: $(x+4)^2 + (y+4)^2 = 16$

Q8. Draw the graph of the following function and find the domain and range.

$$f(x) = \left\{ \begin{array}{l} 4 \quad ; \quad x < 0 \\ \left\lfloor \frac{1}{3}x \right\rfloor ; \quad 0 \leq x \leq 6 \end{array} \right\}$$

Q9. If the slope of the line passing through the point $(2, -1)$ and the vertex of $y = -2(x+k)^2 - 5$

Is $\frac{3}{k}$. Find the value of k **ANS: $k = 6$**

Q10. If the x -intercept of the equation $|y| = 2x - 4$ and the vertex of the parabola $y = -2x^2 + 4x + 1$ are the end points of the diameter of a circle. Write the equation of the circle in standard form.

ANS: (HINT: center = $(3/2, 3/2)$ and $R^2 = 10$)

Q11. If the line $\frac{1}{2}kx + 3y - 7 = 0$ is perpendicular to the line passing through $(1, -0.5)$ and $(-2, -5)$,

then the value of k is equal to:

Q12. If the point $\left(\frac{-1}{4}, t\right)$ is the vertex of the parabola $y = x^2 + mx + 2$ for some real number m ,

then the value of t is equal to:

Q13. Two positive integers p and q satisfy the equation $2p + q = 40$. If their product is a maximum, then the value of $p + q$ is equal to:

Q14. The graph of $y = 2x^2 + 3x - 1$ is translated 1 unit left and 3 units upward, then the equation of the new graph is:

Q15. The graph of the equation $3x^2 = |2x - 5y|$ is symmetric with respect to: **ANS: origin only**

Q16. The slope of the line that passes through the center of the circle $(x + 1)^2 + (y - 3)^2 = 10$ and the vertex of the equation $y = x^2 + 4x$ is equal to:

Q17. The x -intercepts of the line passing through the points $(-2, 1)$ and $(3, -5)$ is equal to:

Q18. If $f(x) = \frac{1}{x^2 - 1}$, $g(x) = \sqrt{x - 1}$, then $(f \circ g)\left(\frac{11}{2}\right) =$ **ANS: $2/7$**