# Math Placement D-Test Sample Problems

(1) Simplify as much as possible:

$$\frac{\sqrt[3]{\frac{a^9}{4}}}{\sqrt[3]{16b^3}}$$

(2) Solve the following equations and inequalities for $x$.

    (a) $\log_x 81 = 4$

    (b) $16^{x-1} = 8$

    (c) $\left| x^2 - 26 \right| = 10$

    (d) $|-3x + 1| < 2$

    (e) $x + \sqrt{2x + 6} = 9$

    (f) $(2x - 3)(3x + 2) \leq 0$

    (g) $\dfrac{2x - 1}{x - 2} \leq 2$

(3) Find the distance between the two points (3,4) and (-5,8).

(4) Let $f(x) = \sqrt{1 + x}$ and $g(x) = \dfrac{3x^2}{x^2 + 1}$.

    (a) Find $g[f(x)]$

    (b) What is the range of $g$?

    (c) Does $f^{-1}$ exist? Does $g^{-1}$ exist? If possible give $f^{-1}$ and $g^{-1}$ and specify their domains.
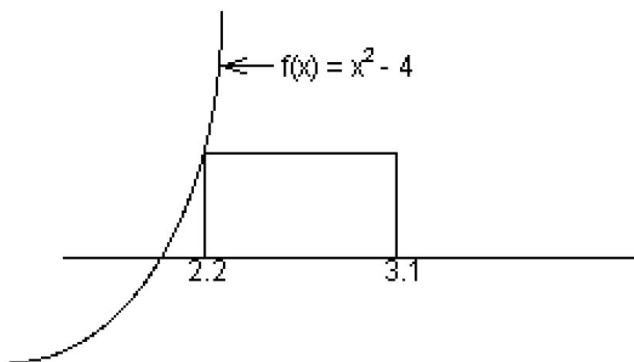
(5) Sketch the graphs of the following equations.

    (a) $x^2 + 9y^2 = 81$

    (b) $y = \log_2 8x$

    (c) $y = x^2 + 4x + 1$ (label vertex)

(6) Find the area of the rectangle pictured.



$f(x) = x^2 - 4$

(7) Give the Center and the radius of the circle $x^2 + y^2 - 6x + 8y = 0$.

(8) If $f(x) = \sin(2x)$, what is $f(\pi/4)$?

(9) What is $\sin\theta$ if $\theta$ is in standard position and $(2, -7)$ is on its terminal side?

(10) Find $\cos\left(2\sin^{-1}\dfrac{\sqrt{2}}{2}\right)$.

(11) Graph these functions. Label your graphs carefully.

    (a) $y = \sin(2x)$, $0 \le x \le 2\pi$

    (b) $y = \cos^{-1}(x)$ or $y = \arccos(x)$

    (c) $y = x\cos(x)$, $-\pi \le x \le \pi$

(12) $\sin\theta\tan\theta + \cos\theta$ is one of the trigonometric functions. Which one?

(13) A regular hexagon (6 sides) is inscribed in a circle of radius 10 feet. Find its perimeter.

(14) If $z_1 = 2 - 3i$ and $z_2 = 3 + i$, find

    (a) $|z_1|$

    (b) $z_1 z_2$

    (c) $\dfrac{z_1}{z_2}$

(15) For what $r$ and $\theta$ does $r(\cos\theta + i\sin\theta) = 8i$?

(16) If $z = (\cos 30° + i\sin 30°)$, find a value of $n$, $n \ne 0$, for which $z^n = 1$.