

## PREPARATION for MATH PLACEMENT TESTING, Test C

Test C covers pre-calculus and trigonometry and is designed to test your readiness for calculus. You may take Test C if you averaged B- or above in a pre-calculus class. To prepare, answer the questions below.

1) Graph each of the following and find the  $x$ - and  $y$ -intercepts:

a)  $3x - 2y + 4 = 0$       b)  $y = -(x - 2)^2 + 1$       c)  $y = x^2 - 4x + 2$

2) Evaluate:      a)  $27^{1/3} 16^{-1/4} =$       b)  $\log_6 2 + \log_6 3 =$

c)  $\log_3 \frac{1}{81} =$       d)  $\sin\left(-\frac{2\pi}{3}\right) =$       e)  $\sec\left(\frac{3\pi}{4}\right) =$

3) Solve each equation for  $x$ :

a)  $\frac{1}{x-1} = 3 - \frac{5}{x-1}$       b)  $\frac{(3x-1)(x+4)}{x-2} = 0$       c)  $y = e^{-3(x+1)}$

d)  $\log_5(x+1) = 2$       e)  $\frac{4}{3}\pi$  radians =  $x$  degrees      f)  $150^\circ = x$  radians

4) Find all real solutions between  $-6$  and  $6$ :

a)  $x(x^2 + x - 6)(x^2 + 1) = 0$       b)  $2 \sin \pi x = 2$       c)  $\tan x = -1$

5) Find the inverse function of  $f(x) = 4 - 3x$ .

6) If  $f(x) = x^2$ , find and simplify  $f(x+h) - f(x)$ .

7) Find the center and radius of the circle with equation  $x^2 - 10x + y^2 + 6y = 2$ .

8) Let  $g(x) = \sqrt{x}$  and  $h(x) = \frac{x}{x^2 - 1}$ . Find each of the following:

a) The domain of  $g$       b) The domain of  $h$       c)  $g(h(x))$       d)  $h(g(x))$

9) If  $\sin x = \frac{3}{5}$  and  $\cos x = \frac{4}{5}$ , then  $\sin 2x = ?$

10) If  $\sin \alpha = 0.6$  and  $\cos \beta = 0.3$ , then find each the following:

a)  $\sin^2 \beta$       b)  $\cos(\beta - \alpha)$

11) If a triangle has sides of length 3 and 8 and included angle of 60 degrees, then the side opposite the angle has what length?

12) If  $0 \leq \theta \leq \pi$  and  $\sec \theta = -\frac{13}{12}$ , what is  $\tan \theta$ ?

**Answers for PREPARATION, Test C:**

**1a)** The graph is a line with  $x$ -intercept  $-4/3$  and  $y$ -intercept 2.

**b)** Parabola with vertex (2, 1),  $x$ -intercepts 1 and 3, and  $y$ -intercept  $-3$ .

**c)** Parabola with vertex (2,  $-2$ ),  $x$ -intercepts  $2 \pm \sqrt{2}$ , and  $y$ -intercept 2.

**2a)**  $3/2$  **b)** 1 **c)**  $-4$  **d)**  $-\sqrt{3}/2$  **e)**  $-\sqrt{2}$

**3a)** 3 **b)**  $-4, 1/3$  **c)**  $-(\ln y + 3)/3$  **d)** 24 **e)** 240 **f)**  $5\pi/6$

**4a)**  $-3, 0, 2$  **b)**  $-5.5, -3.5, -1.5, 0.5, 2.5, 4.5$  **c)**  $-5\pi/4, -\pi/4, 3\pi/4, 7\pi/4$

**5)**  $f^{-1}(x) = (4 - x)/3$

**6)**  $x^2 + 2hx + h^2 - x^2 = h(2x + h)$

**7)** Complete the squares to get  $(x - 5)^2 + (y + 3)^2 = 2 + 25 + 9 = 36$ .

Center = (5,  $-3$ ), radius = 6.

**8a)** All non-negative  $x$  **b)**  $x \neq \pm 1$  **c)**  $\sqrt{\frac{x}{x^2 - 1}}$  **d)**  $\frac{\sqrt{x}}{x - 1}$

**9)**  $\sin 2x = 2 \sin x \cos x = 24/25$

**10a)**  $\sin^2 \beta = 1 - \cos^2 \beta = 0.91$  **b)**  $\cos(\beta - \alpha) = \cos^2 \beta - \sin^2 \alpha = -0.27$

**11)** 7 (use Law of Cosines)

**12)**  $\tan^2 \theta = \sec^2 \theta - 1 = 25/144$ ,  $\tan \theta = -5/12$