Calculus Readiness Test

Work the following problems without assistance or the use of a calculator. Once you have completed the entire problem set, compare your answers with the answers posted on the Math webpage. There are 25 problems on this readiness test. If you get fewer than 20 correct, consider these options:

1. Enroll in Math 103: This is a non credit, pre-calculus course offered in the fall only. Upon successful completion of this class, enroll in Math 111.
2. Enroll in Math 104, Mathematics of Powered Flight or Math 106, Elementary Probability and Statistics: These courses satisfy GER 1. See the Math webpage for course descriptions.

1) Find the real solutions to each:

a) $2x = 8 - x^2$

b) $3x = 8 - x^2$

c) $\frac{3}{x} - \frac{3}{x+2} = 2$

d) $\frac{x^2 - 2x}{x^3 + 3x + 1} = 0$

e) $x + \sqrt{x} - 6 = 0$

f) $\ln x - \ln 3 = 2$

g) $e^{3t} = 100$

h) $\log_2 t + \log_2 (t+1) = 1$

i) $2\cos x - \sqrt{2} = 0, \quad 0 \le x \le 2\pi$

2) Determine the exact coordinates of the point(s) where the following line(s) and curve(s) intersect.

a) $3x + 4y = 5$ and $x - 2y = -6$

b) $y = 8 - x^2$ and $y = 7x$

3) Find the equation of the line:

a) through (2, 7) and (-5, 1)

b) parallel to $3x + 4y = 5$ and through (2, 7)

4) Solve the following inequalities and write the solution using interval notation.

a) $x - 5 \le \frac{1}{2} + 3x$

b) $-3 \le 1 - 2x < 4$

5) Express $\frac{1}{u} - \frac{3}{v}$ as a single fraction.

6) Express $\frac{\sin\theta}{1+\cos\theta} + \frac{\cos\theta}{\sin\theta}$ as a single trigonometric function.

7) Evaluate.

a) $\left(\frac{8x^{12}y^{-3}}{y^6 z^3}\right)^{-\frac{4}{3}}$

b) $\tan\left(\frac{\pi}{3}\right)$

c) $\sin^{-1}\left(-\frac{1}{2}\right)$

8) Let $f(x) = 2x^2 - 2x$.

a) Compute $f(x+h)$

b) Simplify $\frac{f(x+h) - f(x)}{h}$

9) A 10 foot ladder is leaning against a vertical building. Let x be the distance along the floor from the wall to one end of the ladder and let y be the vertical distance from the floor to where the top of the ladder touches the wall. Write an equation expressing y in terms of x.

10) The cost C of building a highway through a certain section of the country is proportional to its length L. A 2.5 mile section costs $1,000,000.

a) Express the cost as a function of length. b) Compute the cost of building 15 miles of highway.

Calculus Readiness Test Answers

1) a) $x = -4, x = 2$

b) $x = -\frac{3}{2} \pm \frac{\sqrt{41}}{2}$

c) $x = -3, x = 1$

d) $x = 0, x = 2$

e) $x = 4$

f) $x = 3e^2$

g) $t = \frac{1}{3}\ln(100)$

h) $t = 1$

i) $x = \frac{\pi}{4}, x = \frac{7\pi}{4}$

2) a) $\left(-\frac{7}{5}, \frac{23}{10}\right)$

b) $(-8, -56)$ and $(1, 7)$

3) a) $y = \frac{6}{7}x - \frac{37}{7}$

b) $y = -\frac{3}{4}x + \frac{17}{2}$

4) a) $[-11, \infty)$

b) $\left(-\frac{3}{2}, 2\right]$

5) $\frac{v - 3u}{uv}$

6) $\csc\theta$

7) a) $\frac{y^{12}z^4}{16x^{16}}$

b) $\sqrt{3}$

c) $\frac{7\pi}{6}$ and $\frac{11\pi}{6}$

8) a) $2x^2 + 4xh + 2h^2 - 2x - 2h$

b) $4x + 2h - 2$

9) $y = \sqrt{100 - x^2}$

10) a) C = 400,000L

b) $6,000,000