

Pre-Calculus Summer Assignment

For Questions 1-10, graph the parent function and all the given transformations. You may use your calculator to help you; however, ultimately you should be able to graph any of these functions without the use of a calculator.

1) Parent Function: $y = x^2$

a) $y = x^2 - 5$

b) $y = x^2 + 3$

c) $y = (x - 10)^2$

d) $y = (x + 8)^2$

e) $y = 4x^2$

f) $y = 0.25x^2$

g) $y = -x^2$

h) $y = -(x + 3)^2 + 6$

l) $y = (x + 4)^2 - 8$

j) $y = -2(x + 1)^2 + 4$

2) Parent Function: $y = \sin x$ (set mode to RADIANS)

a) $y = \sin(2x)$

b) $y = \sin x - 2$

c) $y = 2\sin x$

d) $y = 2\sin(2x) + 2$

3) Parent Function: $y = \cos x$

a) $y = \cos(3x)$

b) $y = \cos\left(\frac{x}{2}\right)$

c) $y = 2\cos x + 2$

d) $y = -2\cos x - 1$

4) Parent Function: $y = x^3$

a) $y = x^3 + 2$

b) $y = -x^3$

b) $y = x^3 - 5$

c) $y = -x^3 + 3$

e) $y = (x-3)^3$

f) $y = (x-1)^3 - 4$

g) $y = -2(x+2)^3 + 1$

h) $y = -\frac{1}{3}(x-1)^3 + 2$

5) Parent Function: $y = \sqrt{x}$

a) $y = \sqrt{x} - 2$

b) $y = \sqrt{-x}$

c) $y = \sqrt{x} + 5$

d) $y = \sqrt{6-x}$

e) $y = -\sqrt{x}$

f) $y = -\sqrt{-x}$

g) $y = \sqrt{x+2}$

h) $y = \sqrt{2x-6}$

i) $y = -2\sqrt{x}$

j) $y = -\sqrt{4-x}$

6) Parent Function: $y = \ln(x)$

a) $y = \ln(x+3)$

b) $y = \ln(x)+3$

c) $y = \ln(x-2)$

d) $y = \ln(-x)$

e) $y = -\ln(x)$

f) $y = \ln(|x|)$

g) $y = \ln(2x) - 4$

h) $y = -3\ln(x) + 1$

7) Parent Function: $y = e^x$

a) $y = e^{2x}$

b) $y = e^{x-2}$

c) $y = e^{2-x}$

d) $y = e^{2x} + 3$

e) $y = -e^x$

f) $y = e^{-x}$

g) $y = 2 - e^x$

h) $y = e^{0.5x}$

8) Parent Function $y = a^x$

a) $y = 5^x$

b) $y = 2^x$

c) $y = 3^{-x}$

d) $y = \left(\frac{1}{2}\right)^x$

e) $y = 4^{x-3}$

f) $y = 2^{x-3} + 2$

9) Parent Function: $y = \frac{1}{x}$

a) $y = \frac{1}{x-2}$

b) $y = \frac{-1}{x}$

c) $y = \frac{1}{x+4}$

d) $y = \frac{2}{5-x}$

10) Parent Function: $y = [x]$

Note: $[x]$ is the IntegerPart of x .

a) $y = [x] + 2$

b) $y = [x - 3]$

c) $y = [3x]$

d) $y = [0.25x]$

e) $y = 3 - [x]$

e) $y = 2[x] - 1$

11) Resize your viewing window to $[0,1] \times [0,1]$. Graph all of the following functions in the same window. List the functions from the highest graph to the lowest graph. How do they compare for values of $x > 1$?

a) $y = x^2$

b) $y = x^3$

c) $y = \sqrt{x}$

d) $y = x^{\frac{2}{3}}$

e) $y = |x|$

f) $y = x^4$

For questions 12-19, use your graphing calculator to find the answers.

12) Given: $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$

Find all roots to the nearest 0.001

13) Given: $f(x) = 3\sin(2x) - 4x + 1$ on $[-2\pi, 2\pi]$

Find all roots to the nearest 0.001.

Note: All trig functions are done in radian mode.

- 14) Given: $f(x) = 0.7x^2 + 3.2x + 1.5$
Find all roots to the nearest 0.001.
- 15) Given: $f(x) = x^4 - 8x^2 + 5$
Find all roots to the nearest 0.001.
- 16) Given: $f(x) = x^3 + 3x^2 - 10x - 1$
Find all roots to the nearest 0.001
- 17) Given: $f(x) = 100x^3 - 203x^2 + 103x - 1$
Find all roots to the nearest 0.001
- 18) Given: $f(x) = |x - 3| + |x| - 6$
Find all roots to the nearest 0.001
- 19) Given: $f(x) = |x| - |x - 6|$
Find all roots to the nearest 0.001

Solve the following inequalities, you should be able to do this without the use of a calculator.

- 20) $x^2 - x - 6 > 0$
- 21) $x^2 - 2x - 5 \geq 3$
- 22) $x^3 - 4x < 0$

For each of the following (problems 23-26).

- Sketch the graph of $f(x)$
- Sketch the graph of $|f(x)|$
- Sketch the graph of $f(|x|)$
- Sketch the graph of $f(2x)$
- Sketch the graph of $2f(x)$

You may use your calculator to help you; however, ultimately you should be able to graph any of these functions without the use of a calculator.

- 23) $f(x) = 2x + 3$
- 24) $f(x) = x^2 - 5x - 3$
- 25) $f(x) = 2\sin(3x)$
- 26) $f(x) = -x^3 - 2x^2 + 3x - 4$

For 27-30, You may use your calculator to help you; however, ultimately you should be able to graph any of these functions without the use of a calculator.

27) Let $f(x) = \sin x$

Let $g(x) = \cos x$

- a) Sketch the graph of f^2
- b) Sketch the graph of g^2
- c) Sketch the graph of $f^2 + g^2$

28) Given: $f(x) = 3x + 2$

$$g(x) = -4x - 2$$

Find the point of intersection

29) Given: $f(x) = x^2 - 5x + 2$

$$g(x) = 3 - 2x$$

Find the coordinates of any points of intersection.

30) How many times does the graph of $y = 0.1x$ intersect the graph of $y = \sin(2x)$?

You may use a graphing calculator to answer 31.

31) If $f(x) = x^4 - 7x^3 + 6x^2 + 8x + 9$

- a) Find the coordinates of the lowest point on the graph.
- b) Find the coordinates of the highest point on the graph.