

# It's Your Turn Problems(Answers)

## I. Functions, Graphs, and Limits

1.

a)  $x = -3, -1, 0, 2, 3$

b) 4

c) DNE

d)  $x = 0, 2$

e)  $x = -3, -1$

f)  $[-3, 0]$

g)  $[0, 2]$

h)  $x = 0$

i)  $[-1, 0]$

j)  $[-4, -3], (-3, -1], [2, 4]$

k) 4

l) 0

m) -1

n) DNE

2.

a)  $[-4, -3], [-1, 2]$

b)  $[-3, -1], [2, 3], (3, 4]$

c)  $[-4, -3], [-3, -2], [-1, 1]$

d)  $[-2, -1], [1, 3]$

e)  $x = -3, -2, -1, 1, 2, 3$

f)  $x = -3, 2$

g)  $x = -1, 3$

h)  $x = -2, -1, 1$

i) DNE

j) -2

k) DNE

3.

a) 0

b) 0

c) 0

d)  $-\infty$

e)  $-\infty$

f)  $-\infty$

g) -1

h) 2

i) 0

j) 2

4.  $e, 1$

5.  $10, 2$

6.  $3, \frac{3}{4}$

7.  $1, 0$

8.

a) No

b) No

c) Yes

d) Yes

e) No

f) Yes

## II. Derivatives

1. maximum

2.

a)  $[0, \infty)$

b)  $(-\infty, 0]$

c) nowhere

d)  $x = 0$

e)  $f(3)$

f)  $f(-3)$

g) yes

h) no

i) yes

3.

a)  $[-1, 2]$

b)  $(-\infty, -1], [2, \infty)$

c)  $x = 2$

d)  $x = -1$

e)  $f(1)$

f)  $f(-2)$

g) no

h) yes

i) no

4.

a)  $2 \cos x$

b)  $-2 \sin x$

c)  $-x \cos x - 903 \sin x$

d)  $21!$

5. a)  $f(0) = -2, f(3) = 4$

b)  $f'(x) = (3x - 1)(x - 5)$ , so at most two zeros

c)  $f(x) = (x - 1)^2(x - 2)$ , so two zeros

6.

a) positive

b) positive

7.  $\frac{3}{4}$

8.

a)  $\frac{n}{x}$

b)  $\ln 2$

c)  $u^*(x) - v^*(x)$

d)  $\left( \frac{u(x)}{u(x) + v(x)} \right) u^*(x) + \left( \frac{v(x)}{u(x) + v(x)} \right) v^*(x)$

9.

a) may be true

b) must be true

c) may be true

d) may be true

e) may be true

f) may be true

g) cannot be true

10.

a)  $\frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{4!}$

b)  $x - x^2 + \frac{x^3}{3}$

c)  $x - \frac{x^3}{18} + \frac{x^5}{5 \cdot 5!}$

11. **Concave-up:**  $(-\infty, -2], [2, \infty)$ , **Concave-down:**  $[-2, 2]$ , **inflection points at**  $x = -2, 2$

$g'(x) = 4x^3 - 48x + 10$ ,  $g'(-4) = -54$ ,  $g'(-3) = 46$ ,  $g'(0) = 10$ ,  $g'(1) = -34$ ,  $g'(3) = -26$ ,

$g'(4) = 74$ , the critical number between  $-4$  and  $-3$  is a minimum, the critical number between  $0$  and  $1$  is a maximum, the critical number between  $3$  and  $4$  is a minimum.

12. 1

13. 0

14.  $\frac{1}{2}$

15.  $-1$

16.  $a = \frac{4}{3}, b = -2$

17.  $\frac{1}{5!}$

18.  $-14$

19.  $a = 3, b = -4, c = -\frac{6}{\pi}$

20.

a)  $\frac{1}{2}$

b)  $\infty$

c)  $\frac{1}{4}$

21.  $\frac{2^{100}}{100!}$

22.

a) no

b) 2

c)  $-1$

23.  $v(x) = 2x \left( \frac{36 - 4x}{2} \right) (24 - 2x); 0 < x < 9$ , maximum volume with  $x = 7 - \sqrt{13}$

24.

a) -16, decreasing

b) decreasing

c) 0,2

d) increasing

e) positive

f) negative

$$y + 9 = -9(x - 1)$$

25.  $y + 9 = \frac{-81}{8}(x - 1)$

### III. Integrals

1.

a) 1

b)  $\sqrt[5]{20}$

2.

a)  $12x^2$

b) 4

3.  $-\frac{1}{2}$

4.

a)  $2\sqrt{26}$

b) 2

5.  $\frac{3\pi}{4}$

6.  $f(x) = \sqrt{3x^2 + 2x}$  or  $f(x) = -\sqrt{3x^2 + 2x}$

7.

a)  $C = \frac{3}{2}$

b)  $C = 1$

c)  $C = 3$

8.  $\frac{x^4}{4}$

9.  $f \equiv 0$  or  $f(x) = \frac{x}{2}$

10.  $\frac{2}{3}$

11.

a) 4

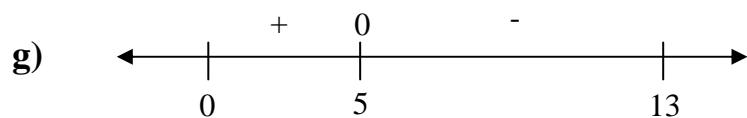
b)  $4 + \frac{9\pi}{4}$

c) 4

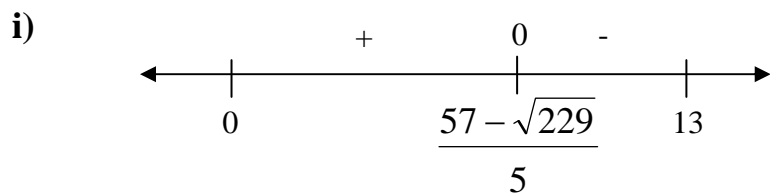
d)  $4 + \frac{9\pi}{2}$

e)  $-\frac{15}{2}$

f)  $-\frac{7}{2}$



h) local maximum at  $x = 5$ , no local minima



12.  $c = \frac{2}{3}$

13. a)  $\frac{91}{80}$

b) too big

c)  $\frac{1}{2}$

14.  $-\frac{1}{36(x^6 + 2x^3)^6} + C$

15.  $p(x) = -3x^2 + 1$

