

### **Exercise: Topic 3**

#### **A. Limit of a function**

1. (a) 3  
(b) Does not exist  
(c) 1  
(d) Does not exist  
(e) 3  
(f) Does not exist
2. (a)  $x=-3$   
(b)  $x=-2, x=0$ ,

#### **B. Limit Laws**

3. (a) 7 (b) 5  
(c)  $1/2$  (d) -2  
(e)  $-2/5$  (f)  $3/8$   
(g)  $35/3$  (h) -2  
(i) 2 (j) 2  
(k) 1 (l) -1
4. (a) 15 (a) 64  
(b) 5 (b) 2  
(c) 6 (c) 12  
(d)  $2/3$  (d) 8
5. (a) 4 (b) 12  
(c)  $1/10$  (d)  $-1/4$   
(e)  $5/6$  (f)  $1/2$   
(g)  $\frac{1}{2\sqrt{5}}$  (h)  $\frac{1}{2\sqrt{2}}$   
(i)  $1/6$  (j)  $1/4$   
(k)  $-1/8$  (l) 4

#### **C. One-Sided Limits**

6.  
Graph 1: (a) 0 (b) 0 (c) 0  
Graph 2: (a) 2 (b) 2 (c) 2  
Graph 3: (a) -2 (b) -2 (c) -2  
Graph 4: (a) 0 (b) 2  
(c) Does not exist

7. (a) 2 (b) 2 (c) 1

#### **D. Infinite Limits and vertical asymptotes**

8. (a)  $-\infty$  (does not exist),  $x=2$   
(b)  $\infty$  (does not exist),  $x=1$

- (c)  $\infty$  (does not exist),  $x=3, x=-3$   
(d)  $1/2$

9. (a)  $x=0$  (b)  $x=2$   
(c)  $x=2, x=-1$  (d)  $x=0, x=1$   
(e)  $x=-2, x=2$  (f) -  
(g) - (h)  $s=-5, s=5$   
(i)  $x=10$  (j)  $x=0$

#### **E. Limit at infinity and horizontal asymptotes**

10.  
(a) 0,  $y=0$  (b) 0,  $y=0$   
(c) 1,  $y=1$  (d)  $-2/3, y=-2/3$   
(e)  $\infty$  (f)  $-\infty$   
(g)  $1/3, y=1/3$  (h)  $2/3, y=2/3$   
(i) 4,  $y=4$  (j) 0,  $y=0$   
(k)  $-\infty$  (l)  $-\infty$

#### **F. Limit involving trigonometric functions**

11. (a)  $1/5$  (b) 0  
(c) 0 (d) 1  
(e) 0 (f) 0  
(g) 0 (h)  $-\pi$   
(i) 1 (j) -2

#### **G. Continuity**

12. (a) Discontinuous at  $x=-2, 2$   
(b) Discontinuous at  $x=1$
13. (a) Discontinuous  
(b) Discontinuous  
(c) Discontinuous
14. (a) (b)  $x=-3, 3$   
(c) (d)  $x=-2, 5$   
(e) (f)  $x=-2, 1$   
(g)  $x=0, 1$  (h)  
(i) (j)  $x=2$   
(k)  $x=2$  (l)