Answers for Worksheet 1

1) $m=3$, $m_\perp=-\frac{1}{3}$	**2)** $m=-\frac{1}{3}$, $m_\perp=3$	**3)** slope = und, $m_\perp=0$	**4)** $x=3$, $y=2$	**5)** $x=0$, $y=-\sqrt{2}$	**6)** $x=-\pi$, $y=\frac{\pi}{4}$
7) $y-2=1(x-1)$	**8)** $y-0=-2(x+4)$	**9)** $y-\pi=\frac{\sqrt{2}}{2}(x+\pi)$	**10)** $y-3=\frac{3}{2}(x-2)$	**11)** $y-\frac{3}{4}=\frac{11}{2}(x-0)$	**12)** $y+2=0(x-3)$ or $y=-2$
13) $m=-\frac{3}{4}$, $(4,0)$, $(0,3)$	**14)** $m=-\frac{4}{3}$, $(3,0)$, $(0,4)$	**15)** undefined, $(4,0)$, none	**16)** $y-2=-2(x+2)$, $y-2=\frac{1}{2}(x+2)$	**17)** $y-4=-\frac{3}{4}(x+6)$, $y-4=\frac{4}{3}(x+6)$	**18)** $y=\frac{1}{2}$, $x=-1$
19) $\frac{67}{2}$	**20)** -13	**21)** -1	**22)** -6	**23) a)** $k=2$ **b)** $k=-2$	

Answers for Worksheet 2

1) **a)** $f(0)=3$ **b)** $f(\sqrt{3})=0$ **c)** $f(-2)=-1$	**2)** **a)** $f\left(-\frac{\pi}{4}\right)=\frac{\sqrt{2}}{2}$ **b)** $f(0)=1$ **c)** $f(1)=2$ **d)** $f(a^2)=2a^2$	**3)** **a)** $f(x+h)=x^2+2xh+h^2-3x-3h+2$ **b)** $f(x+h)-f(x)=2xh+h^2-3h$ **c)** $\frac{f(x+h)-f(x)}{h}=2x+h-3$
4) **a)** $f(g(2))=0$ **b)** $g(f(0))=0$ **c)** $g\left(f\left(\frac{\pi}{4}\right)\right)=\frac{\pi\sqrt{2}}{2}$	**5)** **a)** $f(g(x))=\sqrt{2x+2}$ **b)** $g(f(x))=2\sqrt{x+2}$ **c)** $f(f(x))=\sqrt{\sqrt{x+2}+2}$ **d)** $g(g(x)=4x)$	**6)** **a)** $f(-2)=-2$ **b)** $f(0)=2$ **c)** $f(1)=3$ **d)** $f(s^2+2)=2s^4+8s^2+10$
7) **a)** $D: x\geq 1$ or $[1,\infty)$ **b)** $D:\mathbb{R}$ or $(-\infty,\infty)$ **c)** $D: x\neq 2$ or $(-\infty,2)\cup(2,\infty)$ **d)** $D: x\neq -1,-4$ or $(-\infty,-1)\cup(-1,4)\cup(4,\infty)$		

Answers for Worksheet 3

1) a) $f(0) = 3$ b) $f(-5) < 0$ since $(-5, f(-5))$ sits
$f(8) = -2$ below the x-axis on the graph of $f(x)$.

c) $f(x) = 0$ @ $x = -3, 6, 10$ d) $f(x) = 3$ @ $x = 0, 4$

e) $f(x)$ is increasing on $(-6, 2)$ & $(8, 11)$ b/c
the slope of $f(x)$ is positive

f) $f(x) = \frac{1}{2}$ three times g) $f(f(2)) = f(4) = 3$

h) $(-5, -2)$ $(11, 1)$

$$m = \frac{3}{16}$$

$$y + 2 = \frac{3}{16}(x + 5)$$

or

$$y - 1 = \frac{3}{16}(x - 11)$$

2) a) $f(0) = 1$ b) $f(8) < 0$ since $(8, f(8))$ lies
$f(3) = 2$ below the x-axis

c) $f(x) = 0$ @ $x = -1, 5, 9$ d) $f(x) = 2$ @ $x = 1, 3$

e) $f(x)$ is decreasing on $(-3, -2)$, $(2, 7)$ b/c
the slope of $f(x)$ is negative

f) $f(x) = \frac{1}{4}$ three times

g) $$m = \frac{f(5) - f(2)}{5 - 2}$$

$$= \frac{0 - 3}{3}$$

$$= -1$$

h) $m = 0$

3) a) $(f \circ g)(3) = f(g(3))$
$= f(-1)$
$= 4$

b) $g(f(2)) = g(1)$
$= -2$

c) $g(f(5)) = g(-5)$
$= \emptyset$

d) $f(g(-3)) = f(-2)$
$= 3$

e) $g(f(-1)) = g(4)$
$= 2$

f) $f(g(-1)) = f(4)$
$= -\frac{7}{2}$

4) a) At $t = 10$ min, Holly was 0.75 miles from home.

b) At ~ 14 min, Holly was 1 mile from home.

c) Holly was more than $\frac{1}{2}$ mile from home on $(7, 84)$.

d) Holly was resting on $(60, 74)$

e) Holly reached the ocean at $t \approx 38$ min, 2.5 miles from home

f) $m = \frac{1.5}{20} = 0.075 \frac{\text{miles}}{\text{min}}$

g) $m = 0$ miles/min

h) $t = 90$ min Holly returned home.

i) Holly was jogging fastest @ $t = 29$ min since the graph of her distance is steepest.

Answers to Worksheet 4

1)

a) $f(4) = 103.3549$

b) $f(2.85) = 41.3678$

c) $f\left(\frac{\pi}{6}\right) = 2.0106$

2)

b) $f(-1.5) = 30.815$

c) $f(x) = 0$ @ $x = -3.7519$, $x = 0.2035$, $x = 6.5484$

d) $f(x)$ has a max @ $(-2, 33)$

e) $f(x)$ has a min @ $(4, -75)$

f) $f(0) = 5$

g) $f(x) = g(x)$ @ $x = -3.4856$, $x = 1.861$, $x = 4.6245$

3)

$f(x) = 0$ @ $x = -0.8767$, $x = 0$

$g(x) = -3 + e^{2x}$

$g(x) = 0$ @ $x = 0.5493$

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

$h(x) = 0$ @ $x = 20.0855$

4)

a) $f(x) = g(x)$ @ $x = 1.4645$

b) $f(x) = g(x)$ @ $x = -1.4168$, $x = 4.665$

5)

$f(x)$ has a max @ $(-0.458, -0.728)$, $(3.733, 10.216)$

$f(x)$ has a min @ $(0.910, -1.7307)$

Answers to Worksheet 5

1) $x=\frac{3}{2}, x=-4$	**2)** $x=\frac{-1+\ln 3}{2}$	**3)** $x=\frac{\pi}{18},\frac{5\pi}{18},\frac{13\pi}{18},\frac{17\pi}{18},\frac{25\pi}{18},\frac{29\pi}{18}$
4) $x=4+e^{-6}$	**5)** $x=-1.6729, 1.469, 0.203$	**6)** $x=-0.287, 0.957$
7) $(1,1)$	**8)** $(2,2),(-1,5)$	**9)** $(-1,0),(0,1),(1,0)$
10) $(1,5),(3,3)$	**11)** $(-2.057,-0.884),(2.638,0.481)$	

Answers to Unit 1 Review

1. $y+6=3(x-1)$	2. $x=0$	3. $y-3=-\frac{2}{5}(x-3)$ or $y-5=-\frac{2}{5}(x+2)$	4. $y+12=-\frac{4}{3}(x-4)$
5. $y-2=\frac{2}{3}(x+1)$	6. a) $f(-3)=18$ b) $f(a+2)=a^2-a-12$ c) $\frac{f(x+h)-f(x)}{h}=2x+h-5$	7. a) $f(-3)=1$ b) $f(-1)=-1$ c) $f(1)=\varnothing$ d) $f(b^2+2)=-b^2$	8. $(-2,0),(1,0)$
9. $x=\frac{\ln 20}{5}$	10. $x=\frac{\pi}{12},\frac{5\pi}{12},\frac{13\pi}{12},\frac{17\pi}{12}$	11. $f(-2)=6;\ f(-8)=-4$	
12. $f(x)=0$ at $x=-10,-5,0,$ and 5		13. $f(x)>0$ on $(-\infty,-10),(-5,0),(0,5),(5,\infty)$	
14. $f(x)=1$ six times		15. $f(x)$ is increasing on $(-8,-2),(0,2),$ and $(5,\infty)$	
16. $f(-4)>0$			