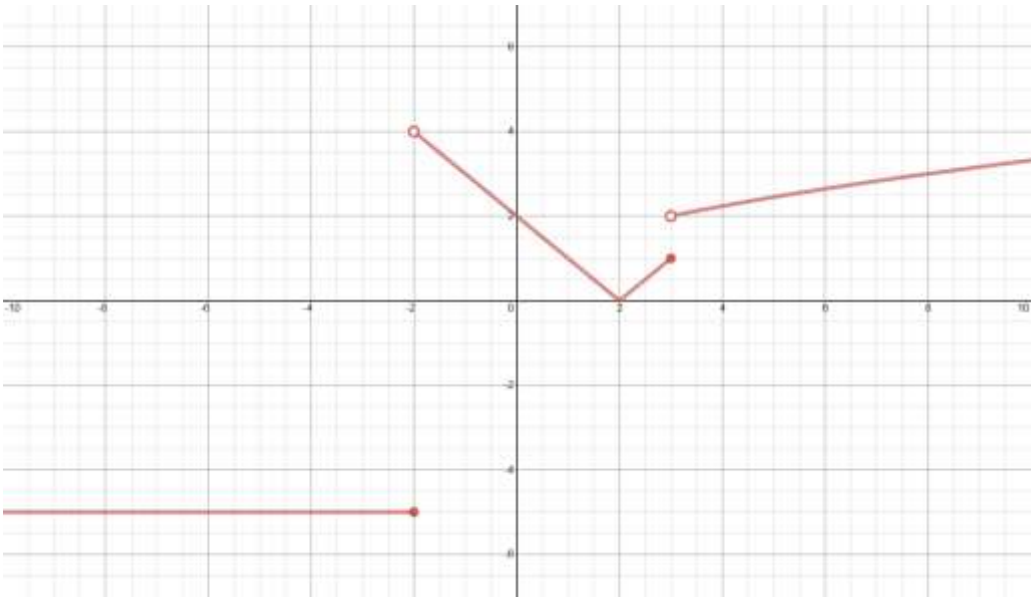
Fall 2015 Final Exam Answer Key

1) $(-\infty, 0) \cup (6, \infty)$

2)



3) (a) $\frac{1}{20}$

(b) $\frac{5+x}{26+5x}$

4) $f^{-1}(4) = \frac{1}{4}\ln(2)$

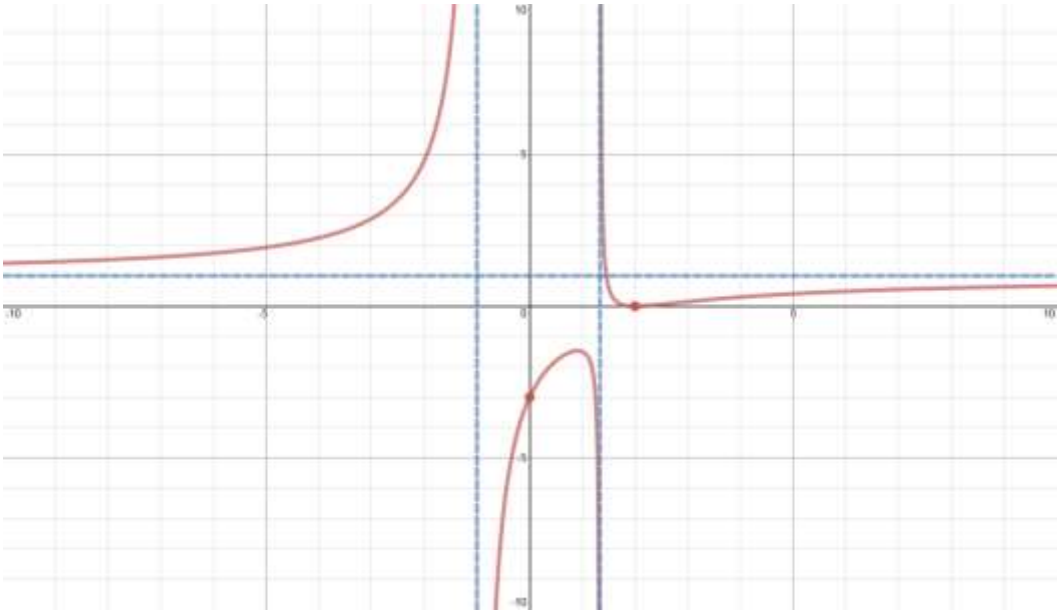
5) $D = [-5, -4) \cup (-4, 0)$

6) $p(x) = (x^2 + 2x + 1)(x^2 + 4) = 2x^4 + 4x^3 + 10x^2 + 16x + 8$

7) $\frac{3}{\sqrt{3a+3h} + \sqrt{3a}}$

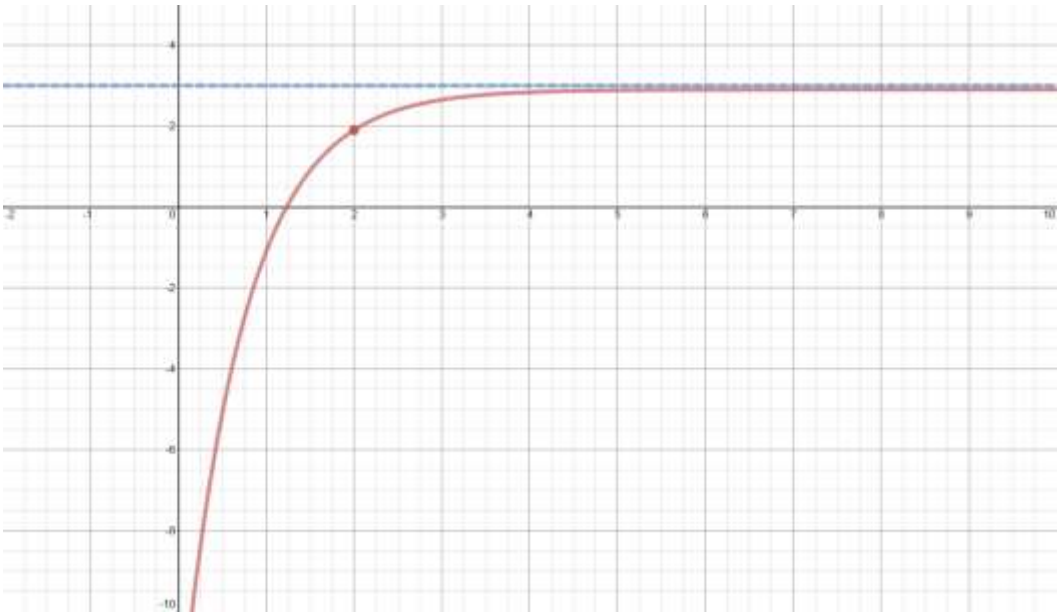
8) $i\sqrt{7}, -i\sqrt{7}, -1+\sqrt{6}, -1-\sqrt{6}$

9)



10) $x = -4$

11)



12) (a) $R(x) = 600x - 50x^2$

(b) $\$ 6.00$

13) (a) -16

(b) $-\frac{13}{24}$

14) $t = \frac{25\ln\left(\frac{7}{6}\right)}{\ln(3)}$ minutes

15) (a) $-\frac{\sqrt{3}}{2}$

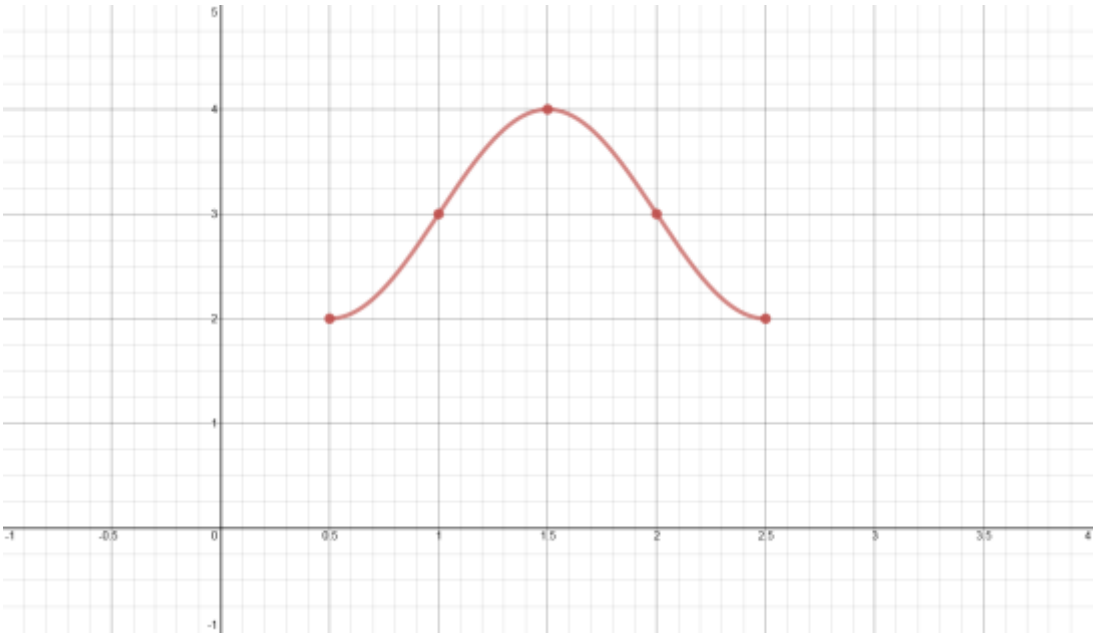
(b) $\sqrt{3}$

16) (a) $-\frac{\pi}{4}$

(b) $\frac{13}{2\sqrt{22}}$

17) $\sin(\theta - \phi) = \frac{4\sqrt{6} - 7}{18}$

18) The points plotted are $\left(\frac{1}{2}, 2\right), (1, 3), \left(\frac{3}{2}, 4\right), (2, 3), \left(\frac{5}{2}, 2\right)$



19)

$$\begin{aligned} LHS &= \frac{1-\cos x}{\sin x} + \frac{\sin x}{1-\cos x} \\ &= \frac{1-\cos x}{\sin x} \cdot \frac{1-\cos x}{1-\cos x} + \frac{\sin x}{1-\cos x} \cdot \frac{\sin x}{\sin x} \\ &= \frac{1-2\cos x + \cos^2 x + \sin^2 x}{\sin x(1-\cos x)} \\ &= \frac{2-2\cos x}{\sin x(1-\cos x)} \\ &= \frac{2(1-\cos x)}{\sin x(1-\cos x)} \\ &= \frac{2}{\sin x} \\ &= 2\csc x = RHS \end{aligned}$$

20) $0, \frac{\pi}{4}, \frac{3\pi}{4}, \pi, \frac{5\pi}{4}, \frac{7\pi}{4}$