# Math 120 - Winter 2014
## Final Exam
## March 15, 2014
## Answers

1. (c) $f(g(0)) = 5$. (d) $f^{-1}(4.5) = 1.25$.

2. (a) It takes Sarah $\pi/4$ hours and Tom takes $\frac{\sqrt{41}}{7}$ hours, so Sarah gets there first.

   (b) $x(t) = \dfrac{-35}{\sqrt{41}}t + 2, y(t) = \dfrac{28}{\sqrt{41}} - 4$

3. (a) 1.70951129135 minutes. (b)

$$N(t) = \begin{cases} 2000(\frac{3}{2})^t & \text{if } 0 \leq t \leq \frac{\ln 5}{\ln \frac{3}{2}} \\ 500\left(t - \frac{\ln 5}{\ln \frac{3}{2}}\right) + 10000 & \text{if } t \geq \frac{\ln 5}{\ln \frac{3}{2}} \end{cases}$$

4. (a) (a)-D, (b)-NONE, (c)-(C), (d)-(A) (b) $x = -2.5$.

5. (a) The first has area $49\pi/8$ while the second has area $32pi/5$, so the second is larger.

   (b) $\dfrac{1080}{13\pi}$ degrees

6. (a) $A = \dfrac{1}{2}y(100 - y - \sqrt{2}y)$ (b) $y = \dfrac{50}{1 + \sqrt{2}}$.

7. (a) $(\sqrt{3}, 1)$ (b) $Q = (\dfrac{4}{\sqrt{3}}, 0)$

8. (a) $h(t) = 4.8\sin\left(\frac{2\pi}{12}(t - 3.5)\right) + 9.6$

   (c) From $y = 3.6593$ to $t = 9.3407$ and from $t = 15.6593$ to $t = 21.3407$.